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ROYAL COMMISSION
ON
AGRICULTURE IN INDIA

Volume VII

EVIDENCE

TAKEN IN THE

United Provinces



CALCUTTA: GOVERNMENT OF INDIA
CENTRAL PUBLICATION BRANCH
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INTERIM REPORT.

THE KING'S MOST EXCELLENT MAJESTY.

May It Please Your Majesty,

We, the Commissioners appointed to examine and report on the present conditions of agricultural and rural economy in British India, and to make recommendations for the improvement of agriculture and to promote the welfare and prosperity of the rural population; in particular, to investigate:—(a) the measures now being taken for the promotion of agricultural and veterinary research, experiment, demonstration and education, for the compilation of agricultural statistics, for the introduction of new and better crops and for improvement in agricultural practice, dairy farming and the breeding of stock; (b) the existing methods of transport and marketing of agricultural produce and stock; (c) the methods by which agricultural operations are financed and credit afforded to agriculturists; (d) the main factors affecting rural prosperity and the welfare of the agricultural population; and to make recommendations; availing ourselves of Your Majesty's permission to report our proceedings from time to time, desire to submit to Your Majesty the minutes of the evidence which we have taken in respect of the United Provinces on the subject of our Inquiry.

All of which we most humbly submit for Your Majesty's most gracious consideration.

(Signed) LINLITHGOW,
Chairman.

(„) H. S. LAWRENCE.
(„) T. H. MIDDLETON.
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(„) B. S. KAMAT.

(Signed) J. A. MADAN,
(„) F. W. H. SMITH,
Joint Secretaries.

30th June, 1927.

TERMS OF REFERENCE

Generally,

To examine and report on the present conditions of agriculture and rural economy in British India and to make recommendations for the improvement of agriculture and the promotion of the welfare and prosperity of the rural population ;

In particular to investigate—

- (a) the measures now being taken for the promotion of agricultural and veterinary research, experiment, demonstration and education, for the compilation of agricultural statistics, for the introduction of new and better crops and for improvement in agricultural practice, dairy farming and the breeding of stock ;
- (b) the existing methods of transport and marketing of agricultural produce and stock ;
- (c) the methods by which agricultural operations are financed and credit afforded to agriculturists ;
- (d) the main factors affecting rural prosperity and the welfare of the agricultural population ;

and to make recommendations.

It will not be within the scope of the Commission's duties to make recommendations regarding the existing system of landownership and tenancy or of the assessment of land revenue and irrigation charges, or the existing division of functions between the Government of India and the local Governments. But the Commission shall be at liberty to suggest means whereby the activities of the Governments in India may best be co-ordinated and to indicate directions in which the Government of India may usefully supplement the activities of local Governments.

QUESTIONNAIRE

PART I

Question.

1. Research.
2. Agricultural education.
3. Demonstration and propaganda.
4. Administration.
5. Finance.
6. Agricultural indebtedness.
7. Fragmentation of holdings.

PART II

8. Irrigation.
9. Soils.
10. Fertilisers.
11. Crops.
12. Cultivation.
13. Crop protection.
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PART III

15. Veterinary.
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PART IV

17. Agricultural industries.
18. Agricultural labour.
19. Forests.
20. Marketing.
21. Tariffs and sea freights.
22. Co-operation.
23. General education.
24. Attracting capital.
25. Welfare of rural population.
26. Statistics.

QUESTIONNAIRE

PART I

1. Research.

(a) Have you suggestions to advance for the better organisation, administration and financing of—

(i) All research affecting the welfare of the agriculturist, including research into the scientific value of the indigenous theory and traditional methods of agriculture,

(ii) Veterinary research ?

(b) If in cases known to you progress is not being made because of the want of skilled workers, or field or laboratory facilities for study or by reason of any other handicaps, please give particulars. [Suggestions of a general kind should be made under (a) ; answers under this heading should relate to specific subjects. The purpose is to secure a list of the problems met with by scientific investigators in the course of their work which are being held over because of lack of resources or deficient organisation.]

(c) Can you suggest any particular subject for research not at present being investigated to which attention might usefully be turned ?

2. Agricultural Education.

With reference to any form of agricultural education of which you may have experience, please state your views on the following :—

(i) Is the supply of teachers and institutions sufficient ?

(ii) Is there an urgent need for extension of teaching facilities in any district or districts known to you personally ?

(iii) Should teachers in rural areas be drawn from the agricultural classes ?

(iv) Are the attendances at existing institutions as numerous as you would expect in present circumstances ; if not, state reasons. Can you suggest measures likely to stimulate the demand for instruction ?

(v) What are the main incentives which induce lads to study agriculture ?

(vi) Are pupils mainly drawn from the agricultural classes ?

(vii) Are there any modifications in existing courses of study which appear to be called for ; if so, what are they ?

(viii) What are your views upon (a) nature study ; (b) school plots ; (c) school farms ?

(ix) What are the careers of the majority of students who have studied agriculture ?

(x) How can agriculture be made attractive to middle class youths ?

(xi) Are there recent movements for improving the technical knowledge of students who have studied agriculture ?

- (xii) How can adult education in rural tracts be popularised ?
 (xiii) In suggesting any scheme for better educational facilities in rural areas, please give your views for (a) its administration and (b) its finance.

3. Demonstration and Propaganda.

(a) What are the measures which in your view have been successful in influencing and improving the practice of cultivators ?

(b) Can you make suggestions for increasing the effectiveness of field demonstrations ?

(c) Can you suggest methods whereby cultivators may be induced to adopt expert advice ?

(d) If you are aware of any striking instances of the success or the failure of demonstration and propaganda work, please give particulars and indicate the reasons for success or for failure.

4. Administration.

(a) Do you wish to suggest means towards the better co-ordination of the activities of the Governments in India or to indicate directions in which the Government of India may usefully supplement the activities of the local Governments ?

(b) Is it your opinion that the expert scientific knowledge required in the development of agriculture in the different Provinces could be supplied to a greater extent than is the case at present by increasing the scientific staff of the Government of India ? If so, indicate the types of work which would benefit by pooling the services of experts, and suggest how that work should be controlled.

(c) Are you satisfied from the agricultural standpoint with the services afforded by—

- (i) The Agricultural and Veterinary Services,
- (ii) Railways and steamers,
- (iii) Roads,
- (iv) Meteorological Department.
- (v) Posts, and
- (vi) Telegraphs, including wireless ?

If not, please indicate directions in which you think these Services might be improved or extended.

5. Finance.

(a) What are your views as to the steps that should be taken for the better financing of agricultural operations and for the provision of short and long-term credit to cultivators ?

(b) Do you wish to suggest means whereby cultivators may be induced to make fuller use of the Government system of *taccavi* ?

6. Agricultural Indebtedness.

(a) What in your opinion are :—

- (i) the main causes of borrowing,
- (ii) the sources of credit, and
- (iii) the reasons preventing repayment.

(b) What measures in your opinion are necessary for lightening agriculture's burden of debt ? For example, should special measures be taken to deal with rural insolvency, to enforce the application of the Usurious Loans Act, or to facilitate the redemption of mortgages ?

(c) Should measures be taken to restrict or control the credit of cultivators such as limiting the right of mortgage and sale ? Should non-terminable mortgages be prohibited ?

7. Fragmentation of Holdings.

(a) Do you wish to suggest means for reducing the loss in agricultural efficiency attendant upon the excessive subdivision of holdings ?

(b) What are the obstacles in the way of consolidation and how can they be overcome ?

(c) Do you consider legislation to be necessary to deal with minors, widows with life interest, persons legally incapable, alienation and dissentients, and to keep disputes out of the courts ?

PART II

8. Irrigation.

(a) Name any district or districts in which you advocate the adoption of new irrigation schemes, or suggest extensions or improvements in the existing systems or methods of irrigation by—

- (i) Perennial and non-perennial canals,
- (ii) Tanks and ponds,
- (iii) Wells.

What are the obstacles in your district or Province to the extension of irrigation by each of the above methods ?

(b) Are you satisfied with the existing methods of distributing canal water to cultivators ? Describe the methods that have been employed to prevent wastage of water by evaporation and by absorption in the soil. What form of outlet for distribution to cultivators at the tail end do you regard as the most equitable and economical ? Have these methods and devices been successful, or do you wish to suggest improvements ?

(N.B.—Irrigation charges are *not* within the terms of reference of the Commission, and should not be commented upon.)

9. Soils.

(a) Have you suggestions to make—

- (i) for the improvement of soils, whether by drainage or other means, not dealt with under other headings in this questionnaire.
- (ii) for the reclamation of Alkali (Usar) or other uncultivable land,
- (iii) for the prevention of the erosion of the surface soil by flood water ?

(b) Can you give instances of soils known to you which, within your recollection, have—

- (i) undergone marked improvement,
- (ii) suffered marked deterioration ?

If so, please give full particulars.

(c) What measures should Government take to encourage the reclamation of areas of cultivable land which have gone out of cultivation ?

10. Fertilisers.

(a) In your opinion, could greater use be profitably made of natural manures or artificial fertilisers ? If so, please indicate the directions in which you think improvement possible.

(b) Can you suggest measures to prevent the fraudulent adulteration of fertilisers ?

(c) What methods would you employ to popularise new and improved fertilisers ?

(d) Mention any localities known to you in which a considerable increase in the use of manures has recently taken place.

(e) Has effect of manuring with phosphates, nitrates, sulphate of ammonia, and potash manures been sufficiently investigated ? If so, what is the result of such investigation ?

(f) What methods would you employ to discourage the practice of using cowdung as fuel ?

11. Crops.

(a) Please give your views on—

- (i) the improvement of existing crops,
- (ii) the introduction of new crops including fodder crops,
- (iii) the distribution of seeds,
- (iv) the prevention of damage by wild animals.

(b) Can you suggest any heavy yielding food crops in replacement of the present crops ?

(c) Any successful efforts in improving crops or substituting more profitable crops which have come under your own observation should be mentioned.

12. Cultivation.

Can you suggest improvements in—

- (i) the existing system of tillage, or
- (ii) the customary rotations or mixtures of the more important crops ?

13. Crop Protection, Internal and External.

Please give your views on—

- (i) The efficacy and sufficiency of existing measures for protection of crops from external infection, pests and diseases.
- (ii) The desirability of adopting internal measures against infection.

14. Implements.

(a) Have you any suggestion for the improvement of existing, or the introduction of new, agricultural implements and machinery ?

(b) What steps do you think may usefully be taken to hasten the adoption by the cultivator of improved implements ?

(c) Are there any difficulties which manufacturers have to contend with in the production of agricultural implements or their distribution for sale throughout the country? If so, can you suggest means by which these difficulties may be removed?

PART III

15. Veterinary.

(a) Should the Civil Veterinary Department be under the Director of Agriculture or should it be independent?

(b) (i) Are dispensaries under the control of Local (District) Boards? Does this system work well?

(ii) Is the need for expansion being adequately met?

(iii) Would you advocate the transfer of control to Provincial authority?

(c) (i) Do agriculturists make full use of the veterinary dispensaries? If not, can you suggest improvements to remedy this?

(ii) Is full use made of touring dispensaries?

(d) What are the obstacles met with in dealing with contagious diseases? Do you advocate legislation dealing with notification, segregation, disposal of diseased carcasses, compulsory inoculation of contacts and prohibition of the movement of animals exposed to infection? Failing legislation, can you suggest other means of improving existing conditions?

(e) Is there any difficulty in securing sufficient serum to meet the demand?

(f) What are the obstacles in the way of popularising preventive inoculation? Is any fee charged, and, if so, does this act as a deterrent?

(g) Do you consider that the provision of further facilities for research into animal disease is desirable?

If so, do you advocate that such further facilities should take the form of—

(i) an extension of the Muktesar Institute, or

(ii) the setting up, or extension of, Provincial Veterinary Research Institutions?

(h) Do you recommend that special investigations should be conducted by—

(i) officers of the Muktesar Institute, or

(ii) research officers in the Provinces?

(i) Do you recommend the appointment of a Superior Veterinary Officer with the Government of India? What advantages do you expect would result from such an appointment?

16. Animal Husbandry.

(a) Do you wish to make suggestions for—

(i) improving the breeds of livestock,

(ii) the betterment of the dairying industry,

(iii) improving existing practice in animal husbandry?

(b) Comment on the following as causes of injury to cattle in your district—

- (i) Overstocking of common pastures,
- (ii) Absence of enclosed pastures, such as grass borders in tilled fields,
- (iii) Insufficiency of dry fodder such as the straw of cereals or the stems and leaves of pulses,
- (iv) Absence of green fodders in dry seasons,
- (v) Absence of mineral constituents in fodder and feeding stuffs.

(c) Please mention the months of the year in which fodder shortage is most marked in your district. For how many weeks does scarcity of fodder usually exist? After this period of scarcity ends how many weeks elapse before young growing cattle begin to thrive?

(d) Can you suggest any practicable methods of improving or supplementing the fodder supply that would be applicable to your district?

(e) How can landowners be induced to take a keener practical interest in these matters?

PART IV

17. Agricultural Industries.

(a) Can you give any estimate of the number of days of work done by an average cultivator on his holding during the year? What does he do in the slack season?

(b) Can you suggest means for encouraging the adoption of subsidiary industries? Can you suggest any new subsidiary industries to occupy the spare time of the family which could be established with Government aid?

(c) What are the obstacles in the way of expansion of such industries as beekeeping, poultry rearing, fruit growing, sericulture, pisciculture, lac culture, rope making, basket making, etc.?

(d) Do you think that Government should do more to establish industries connected with the preparation of agricultural produce for consumption, such as oil pressing, sugar making, cotton ginning, rice hulling, utilisation of wheat straw for card-board, utilisation of cotton seed for felt, fodder, oil and fuel, utilisation of rice straw for paper, etc.?

(e) Could subsidiary employment be found by encouraging industrial concerns to move to rural areas? Can you suggest methods?

(f) Do you recommend a more intensive study of each rural industry in its technical, commercial and financial aspects, with a view to, among other things, introduction of improved tools and appliances?

(g) Can you suggest any other measures which might lead to greater rural employment?

(h) Can you suggest means whereby the people could be induced to devote their spare time to improving the health conditions of their own environment?

18. Agricultural Labour.

(a) What measures, if any, should be taken to attract agricultural labour from areas in which there is a surplus to—

(i) areas under cultivation in which there is a shortage of such labour ?
and

(ii) areas in which large tracts of cultivable land remain uncultivated ?

Please distinguish between suggestions designed to relieve seasonal unemployment and proposals for the permanent migration of agricultural population.

(b) If there is any shortage of agricultural labour in your Province, what are the causes thereof and how could they be removed ?

(c) Can you suggest measures designed to facilitate the occupation and development, by surplus agricultural labour, of areas not at present under cultivation ?

19. Forests.

(a) Do you consider that forest lands as such are at present being put to their fullest use for agricultural purposes ? For instance, are grazing facilities granted to the extent compatible with the proper preservation of forest areas ? If not, state the changes or developments in current practice which you consider advisable.

(b) Can you suggest means whereby the supply of firewood and fodder in rural areas may be increased ?

(c) Has deterioration of forests led to soil erosion ? What remedies would you suggest for erosion and damage from floods ?

(d) Can you indicate any methods by which supply of moisture in the soil, the rainfall and supply of canal water can be increased and regulated by afforestation or by the increased protection of forests so as to benefit agriculture ? Would the same methods be useful in preventing the destruction by erosion of agricultural land ?

(e) Is there an opening for schemes of afforestation in the neighbourhood of villages ?

(f) Are forests suffering deterioration from excessive grazing ? Is soil erosion being thereby facilitated ? Suggest remedies.

20. Marketing.

(a) Do you consider existing market facilities to be satisfactory ? Please specify and criticise the markets to which you refer, and make suggestions for their improvement.

(b) Are you satisfied with the existing system of marketing and distribution ? If not, please indicate the produce to which you refer and describe and criticise in detail the channels of marketing and distribution from the producer to the consumer in India (or exporter in the case of produce exported overseas). State the services rendered by each intermediary and whether such intermediary acts in the capacity of merchant or commission agent, and comment upon the efficiency of these services and the margins upon which such intermediaries operate. Please describe

the method by which each transaction is financed, or in the case of barter, by which an exchange is effected.

(c) Do you wish to suggest steps whereby the quality, purity, grading or packing of agricultural produce may be improved, distinguishing where possible between produce destined for—

- (i) Indian markets ?
- (ii) Export markets ?

(d) Do you think that more effective steps might be taken to place at the disposal of cultivators, merchants and traders information as to market conditions, whether Indian or overseas ; crop returns ; complaints as to Indian produce from wheresoever originating ; and agricultural and marketing news in general ?

21. Tariffs and Sea Freights.

Do existing (a) customs duties, both import and export, and (b) sea freights adversely affect the prosperity of the Indian cultivator ? If so, have you any recommendations to make ?

22. Co-operation.

(a) What steps do you think should be taken to encourage the growth of the co-operative movement—

- (i) by Government,
- (ii) by non-official agencies ?

(b) Have you any observations to make upon—

- (i) Credit societies ;
- (ii) Purchase societies ;
- (iii) Societies formed for the sale of produce or stock ;
- (iv) Societies for effecting improvements—*e.g.*, the digging of wells and the construction of bunds, walls and fences, or the planting of hedges ;
- (v) Societies formed for the aggregation of fragmented holdings and their redistribution in plots of reasonable size ;
- (vi) Societies for the co-operative use of agricultural machinery ;
- (vii) Societies for joint farming ;
- (viii) Cattle breeding societies ;
- (ix) Societies formed for any purpose connected with agriculture or with the betterment of village life, but not specified above ?

(c) Where co-operative schemes for joint improvement, such as co-operative irrigation or co-operative fencing or a co-operative consolidation of holdings scheme, cannot be given effect to owing to the unwillingness of a small minority to join, do you think legislation should be introduced in order to compel such persons to join for the common benefit of all ?

(d) Do you consider that those societies of which you have personal knowledge have, in the main, achieved their object ?

23. General Education.

(a) Do you wish to make observations upon existing systems of education in their bearing upon the agricultural efficiency of the people? If you make suggestions, please distinguish, as far as possible, between—

- (i) Higher or collegiate,
- (ii) Middle school, and
- (iii) Elementary school education.

(b) (i) Can you suggest any methods whereby rural education may improve the ability and culture of agriculturists of all grades while retaining their interest in the land?

(ii) What is your experience of compulsory education in rural areas?

(iii) What is the explanation of the small proportion of boys in rural primary schools who pass through the fourth class?

24. Attracting Capital.

(a) What steps are necessary in order to induce a larger number of men of capital and enterprise to take to agriculture?

(b) What are the factors tending to discourage owners of agricultural land from carrying out improvements?

25. Welfare of Rural Population.

(a) Outside the subjects enumerated above, have you any suggestions to offer for improving hygiene in rural areas and for the promotion of the general well-being and prosperity of the rural population?

(b) Are you, for instance, in favour of Government conducting economic surveys in typical villages with a view to ascertaining the economic position of the cultivators? If so, what, in your opinion, should be the scope and methods of such enquiries?

(c) If you have carried out anything in the nature of such intensive enquiry, please state the broad conclusions which you reached.

26. Statistics.

(a) Do you wish to make suggestions for the extension or improvement of the existing methods of—

- (i) ascertaining areas under cultivation and crops;
- (ii) estimating the yield of agricultural produce;
- (iii) enumerating livestock and implements;
- (iv) collecting information on land tenure, the incidence of land revenue and the size of the agricultural population;
- (v) arranging and publishing agricultural statistics?

(b) Have you any other suggestions to make under this heading?

ROYAL COMMISSION ON AGRICULTURE.

MINUTES OF EVIDENCE

TAKEN BEFORE THE

ROYAL COMMISSION ON AGRICULTURE.

Monday, January 31st, 1927.

LUCKNOW.

PRESENT:

The MARQUESS OF LINLITHGOW, D.L. (*Chairman*).

SIR HENRY STAVELY LAWRENCE,
K.C.S.I., I.C.S.
SIR THOMAS MIDDLETON, K.B.E.,
C.B.
RAI BAHADUR SIR GANGA RAM, Kt.,
C.I.E., M.V.O.
SIR JAMES MACKENNA, Kt., C.I.E.,
I.C.S.

MR. H. CALVERT, C.I.E., I.C.S.
RAJA SRI KRISHNA CHANDRA
GAJAPATI NARAYANA DEO of Parla-
kinedi.
PROFESSOR N. GANGULEE.
DR. L. K. HYDER.
MR. B. S. KAMAT.

MR. A. W. PIM, C.S.I., C.I.E., I.C.S. } (*Co-opted Members.*)
RAJA SIR RAMPAL SINGH }

MR. J. A. MADAN, I.C.S. } (*Joint Secretaries.*)
MR. F. W. H. SMITH }

MR. G. CLARKE, F.I.C., C.I.E., M.L.C., Director of Agriculture,
United Provinces.

Replies to the Questionnaire.

QUESTION 1.—RESEARCH.—(a) Agriculture is a Transferred Subject. Funds for the development of agricultural research depend on the vote of the Legislative Council. No power of certification exists.* This is the position with which the Minister and his agricultural adviser the Director of Agriculture have to deal.

The Council, therefore, has to be convinced of the soundness of the research programme. Like the members of all representative bodies, the members of the Council prefer work leading quickly to practical results. In this respect the Legislative Council does not differ from Parliament and County Councils in England. I have had experience of County Councils in England and of the Legislative Council in the United Provinces. I have no hesitation in saying that it is as easy to get money voted for research in these Provinces as it is in England, if the problems have a direct bearing on provincial agriculture.

*See also Question 34,234, page 87.

In the United Provinces Council agriculture is kept outside party politics. All parties are anxious for progress. In recent years, when the Agricultural Department has been the subject of debate, Ministers have been attacked on the grounds of not being able to obtain sufficient funds for agricultural research and development, on one occasion only for proposing too much.

I have served as Director and a member of the Legislative Council under three Ministers of different political views and for the five years March 1922, to March 1926, not a single cut has been made in the demands for grants presented by the Minister. There has been considerable detailed criticism but this is becoming more and more constructive and has always been helpful. In fact, it has led to the removal of many defects and we are now both with regard to the appreciation of the importance of research and the advancement of agricultural development generally in closer touch with the needs of the Province than we have been before.

The budget provision voted by the Council in 1926-27 was Rs.24.4 lakhs, the highest figure yet attained, of which Rs.3.9 lakhs was for higher agricultural education and research. This does not include large non-recurring expenditure on the extension of the Agricultural College. I think, therefore, that I am justified in the opinion that agricultural development (including research) has prospered under Council control in these Provinces and that no radical alteration is desirable even if it were possible in the present method of administration.

Removal of responsibility for the investigation of the fundamental problems of agriculture from the Council would, in my opinion, have a deadening effect on provincial development.

The Council should realise and I am convinced it now does, as the result of five years' experience, that it is one of its primary duties to provide for agricultural research. It would be a fatal mistake to make proposals which would lessen the sense of responsibility.

The agricultural development of the Province should be regarded as a whole and not as the problem of growing sugarcane, cotton, rice or any particular crop which leads to one-sided development if pushed too far. It is better that the whole agricultural development of the Province should be co-ordinated by the Director assisted by expert boards and committees under the general direction of a Minister responsible to the Legislative Council. For this reason I prefer, as stated in answer to Question 4 (b) below, to place the research staff of the Province on an adequate footing rather than to increase the scientific staff of the Government of India and to establish research stations in the Provinces controlled by the Government of India.

There is another aspect of the question of finance which presents difficulty sometimes, i.e., the state of the provincial finances. This may at any time limit the amount available for agricultural research. It may not be possible for the Finance Department to sanction the presentation to the Council of the Minister's full demands for agricultural research. At the moment, as the result of a series of good seasons, there is no complaint. The Finance Department is sympathetic but it cannot do impossibilities. The claims of elementary education, public works and public health have to be met. It is considered and considered rightly that the development of these must precede a general rise in the condition of the agricultural population.

The main requirement of my department is provision for a steady rate of progress. Violent fluctuations in financial provision are liable to throw us out of balance. At any time a series of bad seasons may make retrenchment inevitable and agricultural research is very likely to be the first thing to suffer.

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It seems to me, therefore, that if the Government of India desires to advance the agricultural development of the Province it should be prepared to assist the Local Government with their agricultural budgets when they are unable to present full demands for research work to the Council owing to financial stringency or any other cause. A further safeguard that agricultural research should be uninterrupted, would be to assign a portion of the annual remission definitely for agricultural research and development.

(b) There is a dearth of experienced workers for the problems connected with plant breeding and crop improvement. This is traceable in part to the long delay in deciding on what basis permanent recruitment to the higher posts (including research posts) should be made. The question is still unsettled and the rules delegating powers to the Local Government are being reconsidered by the Secretary of States.

The production of better and heavier yielding varieties of crops is probably the most difficult and complicated problem facing agriculture in India to-day, but the introduction of a better variety of any of the staple crops leads, quicker than any other method, to an enormous increase in the value of the produce and the material prosperity of the cultivator.

Experience as well as high technical qualifications are required to obtain results in crop-improvement within a reasonable time. The present mode of attacking the problem is to appoint young graduates who have taken a good degree in natural science and have had a short training in research methods. They are also called upon to undertake teaching in the Agricultural College. It is not reasonable to expect immediate results of economic value. We have at the present time young officers working on rice, cotton, barley, oil-seeds and fibre crops and potatoes. I am not entirely satisfied with the rate of progress. I feel, in the first place, that we are not likely to produce a really efficient corps of workers such as will enable us in future to become self-supporting in the matter of crop research by setting young and inexperienced officers to work on these difficult problems without experienced and detailed technical guidance and secondly that the production of better varieties of crops is of such vital importance to the material welfare of the cultivator that we cannot afford to wait and take the risks of delay which our present method involves. Practically all the crops of the Province need immediate investigation.

What is needed in this Province is to replace the isolated workers on special crops by a combined section of plant breeding and crop-improvement under a senior officer of wide experience and achievement in this line of work. In this section all work on crop-improvement will be co-ordinated. It will be necessary to search the world to obtain a good man and a high salary will have to be paid for a short term agreement. It will pay handsomely in the long run if a good man can be found to give a salary of Rs.2,000 or even 3,000 for a five years agreement.

The section of plant breeding would absorb two of the three Economic Botanists leaving the remaining Economic Botanist free for higher botanical teaching in the Agricultural College.

The whole time staff of the new section would thus provisionally consist of (1) the Head of the section and (2) two Economic Botanists with their subordinate staff of Assistants, laboratories and research farms at Cawnpore and Rays. For (2) there is already provision in the provincial budget.

The additional facilities required will be another research station in a rice growing tract. This will be required immediately and later two other research stations for trying out the varieties produced as well as some extension of the existing research stations.

The Head of the section will organise the work of crop improvement in the Province and prepare a programme based on provincial needs. When

this has been approved, work of definite responsibility on one or two crops will be given to each officer of the section.

In addition to taking the intensive study of one or possibly two main crops himself, an important part, in fact the most important part, of the work of the new Head of the section will be to guide and train the young officers placed under him.

The scheme may be criticised on the grounds of additional expense but expense is justified by the possibilities of an intensive campaign of crop improvement in these Provinces.

The proposal has the advantage of providing a well balanced scheme based on provincial requirements. It ensures that the special problems of the Province will receive adequate attention. It is not at all likely that a research station for one crop under the Central Government would serve all Provinces equally well, or indeed, be able to cope with more than a mere fraction of the problems. The staff of a central institute would develop a preference for one Province and its problems would receive their attention. The establishment of a strong section devoted entirely to provincial crop improvement will preserve the local sense of responsibility for local problems which, as stated in answer to Question 1 (a), I regard as important at the present time. I think the scheme will be acceptable to the Council because it affords an opportunity by means of the highly specialised training that can be given to our young officers of making the Province self-supporting within a measurable period of time as regards a most important branch of agricultural research.

The provincial budget for recurring expenditure on economic botany (wholly devoted to research on crop improvement) is as follows. It is proposed to incorporate the above in the new section of crop-improvement.

Economic Botany Rs.71,571

There is additional recurring provision for the teaching of botany in the agricultural college amounting to Rs.35,310.

This will be kept separate from and outside the new section.

The capital expenditure already made by the Local Government wholly for research in economic botany and plant pathology, *i.e.*, for research stations and equipment is given below. This does not include laboratory accommodation provided in the agricultural college, which will be still available for the new section of crop improvement.

	Rs.
Botanical Research Farm, Cawnpore	56,506
Cotton Research Farm, Muttra	1,18,767
Total	<u>1,75,273</u>

The additional expenditure involved in the appointment of a Head of the section of crop-improvement now proposed is given below:—

RECURRING.

Salaries.

Head of section:

	Rs.	Rs.
Rs.2,000—50—2,250	24,000	
1 U.P.A.S officer:		
Rs.250—25—750	3,000	27,000
Establishment:		
3 Subordinate Agricultural Service officers on		
Rs.110	3,960	
2 clerks, Rs.100—5—150 at Rs.110 each ...	2,640	
4 peons on Rs.12	576	7,176

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I realise that any provision made by the Government of India will have to be voted by the Central Legislature. I do not propose that the Government of India should hand over large sums of money to the Local Government without being able to ascertain that it is being spent properly for the purpose for which it is given. No Legislative Body would vote money without some form of control.

I would like to develop between the Central and Local Governments with regard to agricultural research the same relation as exists between the Ministry of Agriculture and the local authorities, University Departments of Agriculture and County Councils, who are responsible for carrying out research schemes in England. The Minister of Agriculture who is responsible to Parliament for the expenditure of funds voted for agricultural development keeps in close touch through his scientific adviser with the work of the local bodies by whom research schemes are being carried out.

The Government of India could provide for similar inspection of subsidised schemes by means of an Agricultural Commissioner and his expert staff.

(c) *Manufacture of synthetic nitrogen compounds in India.*—The Indian Sugar Committee, in paragraph 238 of their Report, drew attention to the importance of utilising power from hydro-electric schemes in India for nitrogen fixation by the cyanamide and other processes. The recommendation was made that cyanamide should be first investigated. Since the Sugar Committee's Report was published in 1920, new processes have been developed and it would probably now be advisable to investigate those for the production of synthetic ammonia compounds. However this may be, the question of manufacturing synthetic nitrogen compounds and so making India self-supporting in the matter of nitrogen fertilisers, is of great importance and its solution must precede the intensification of Indian agriculture. No action has been taken, or appears to be likely to be taken by the Government of India, on the Sugar Committee's recommendations. The problem requires highly specialised knowledge and it seems to me to fall within the class of problems covered by this question. It is an All-India problem and should be taken up by the Central Government.

Research into the expenditure of irrigation water.—In paragraph 290 of the Report* on Agriculture in the United Provinces, the Chief Engineer points out the necessity for the creation of a research division in the Canal Department. As he rightly says, the research should not be limited to the disposal of water on the fields but should include every phase of the transit of water from the canal-head works to the utilisation by the crop in the field. The problem falls into two parts. The research division of the Irrigation Department would account for water from the head-works to the field. Its utilisation after it has reached the field is for the Agricultural Department to investigate.

The complete investigation of the problem is very necessary at the present time, as an entirely new system of irrigation, i.e., the Sarda canal is shortly to begin working.

Two things are required: (1) Research division in the Irrigation Department, and (2) a special research station for the investigation of the water requirements of crops in a typical Sarda canal area. Sitapur and Kheri are suitable districts. The development of this branch of investigation has been held up for want of facilities.

Marketing of agricultural produce.—Any one acquainted with the complexity of the interests involved in the collection and distribution of all kinds of agricultural produce in this Province, will hesitate to express any opinion regarding the special steps that can be taken to improve the present practice, with the incomplete statistical information now available.

*Not published.

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Before the question can be adequately examined a great deal more information is required. In fact, the present practice is so intimately bound up with the life and social customs of people that attempt at change, not based on full and correct statistical information, would probably lead to disaster. I include this, therefore, in the list of subjects which have not received expert investigation.

QUESTION 2.—AGRICULTURAL EDUCATION.—I can answer this question better by giving my views (1) on education in relation to agricultural advancement and (2) on the lines on which development of agricultural education controlled by my department should proceed than by answering separately sub-sections (i) to (xiii). The information asked for will be given as the points raised occur in the context of my answer.

(1) *Primary Education.*—My colleague, the Director of Public Instruction, makes the following statement in para. 352 of the Report on Agriculture in the United Provinces.

“Without efficient education in the villages, movements which aim at raising the standard of life of the agricultural population and improving their economic position will make slow progress.”

With this statement I agree. It applies probably with greater force to the introduction of improvements in the technical processes of agriculture than to any other phase of rural development.

It has been clear for many years to agricultural officers that a general rise in the standard of agricultural practice is retarded by the absence of general primary education among the mass of agricultural workers. The hesitation of the cultivator to adopt obvious and profitable improvements is due largely to the absence of the faculty of thinking for himself.

I put, therefore, the extension and improvement of primary education (on the lines laid down in para. 352 of the report referred to above) in the forefront of the programme of education in its bearing on agricultural development.

I attach more importance to the primary schools as training grounds of faculty than as places for imparting technical knowledge such as improved processes and so forth. The first and more important thing is to teach the village boy to read and write and to think for himself. The Agricultural Department by means of propaganda and demonstration can teach the technical processes of agriculture after primary school age (the right time to learn them) if the ground is prepared.

Agricultural Schools.—A vocational school of the Bulandshahr type is the point where the educational work of the Agricultural Department gets into closest touch with the sons of the larger tenants and the small zamindars. Those classes correspond closer than anything in India, to the farmer in England. It is they who have first-hand knowledge and get to grips with the real problems. Their influence on the mass of their uneducated or poorly educated neighbours (the cultivators) is immense. The schools, now being discussed as their name implies, teach practical agriculture and give instruction in new processes, the use of new machinery and methods of farming. I have no doubt that they will be the most powerful of all the Department's educational activities, in spreading detailed knowledge of modern agricultural methods through the countryside.

The agricultural school at Bulandshahr was started in 1921. Gloomy prognostications regarding its future were made. We have, therefore, had to move cautiously and to satisfy ourselves on several points before embarking on a larger programme of this type of education. I think now the results have proved the usefulness of the Bulandshahr school and of this type of agricultural education generally. There are at the time of writing 49 students in residence and 11 teachers under training of the Education Department. Since the school was opened 85 students have

passed out, the greater part of whom have settled down in their homes, to the work they would have done if they had not come to the school, and I am confident they are better equipped for that work.

Vocational schools are expensive, there is no doubt about that. The equipment of the laboratories, workshop and farm, must be first-class if any good is to be done. The teachers, moreover, must be highly trained in technical work. A large number of students cannot be instructed at one time. The total cost of the Bulandshahr School was non-recurring Rs. 2.75 lakhs. The recurring is Rs. 28,962. The main items of the capital expenditure are school buildings and laboratories, residences, land and equipment.

The teaching at Bulandshahr is in the vernacular and it is intended to take boys from the vernacular schools, preferably those in which preliminary agricultural teaching has been given. It is in the latter schools that the middle class boys of the Province who follow rural pursuits in after life are educated. We insist that all applicants for admission should furnish a proof of the possession of land or some other satisfactory indication of connection with rural pursuits. A few stray in who have no connection with the land, but I think we can claim now that we have got together a class who come with the object of using the knowledge they have gained in after life. All of them, I have no doubt, would like a post in the Agricultural Department if they could get one. The desire for Government service is incurable. I have been severely criticised in Council on several occasions for not guaranteeing posts to students of this school and I have to yield the pressure to the extent of making a certain number of appointments, seven since the school was opened.

I regard it as a matter of importance that no guarantee should be given of Government service. If this is done the whole object of the schools will be frustrated.

The average age of boys at Bulandshahr school is 19. This is a little old and we shall try in the new schools which we are proposing to open to get boys of slightly lower age. I consider the time has now come when we can safely increase the number of schools of the Bulandshahr type. There is a demand in Council for more. The latter body are not likely to recommend such expensive items as agricultural schools if they are not satisfied with the results of the one in existence.

Steps are being taken to establish vocational agricultural schools at Fyzabad for the Province of Oudh and Gorakhpur for the eastern districts. The total cost of each school which is to accommodate 70 to 80 boys is estimated recurring Rs.30,000, non-recurring Rs.2.75 lakhs. No difficulty is anticipated in obtaining funds for this in the provincial budget.

I now give my views on another important aspect of agricultural education referred to by the Director of Public Instruction in paragraph 345 of the Report on Agriculture in the United Provinces, namely, agricultural vernacular middle schools. It will be seen that the teaching of agriculture has been, or shortly will be, introduced into 20 vernacular middle schools in rural areas, at a total annual cost per school of Rs.4,000 non-recurring and Rs.348 recurring of which Government provides half the non-recurring, i.e., Rs.2,000 per school in addition to the cost of training the teachers. The subject is taught by teachers trained by the Agricultural Department and assistance is given by the Deputy Directors in the management of the small school farms. The cost of the scheme is in the educational budget and the work is under the control of that department. It is yet too early to express a definite opinion on the results in this Province. It has been successful in the Punjab and is regarded, I understand, by the authorities there (I am open to correction in this point) as taking the place of vocational training in schools of the Bulandshahr and Loni (Bombay) type. As stated below, I cannot accept this for the United Province. At the

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same time I consider that agricultural teaching in vernacular schools can become a powerful agency for agricultural development. The function of such teaching is to open boys' minds to the possibilities of scientific agriculture and most important of all to create the desire to learn more. If successfully developed it will influence numbers that no other form of teaching can hope to do and will thus go a long way to prepare the province for agricultural propaganda.

For development more funds are required to establish agricultural teaching in a larger number of schools. I do not think the Education Department will have any difficulty in obtaining funds. A larger number of trained teachers is required. It is important for success that the teachers should be knowledgeable about agricultural matters and able to make the school farms examples of good cultivation. Nothing is so quickly ridiculed in rural areas as bad farming. If my proposals for the extension of agricultural schools are accepted, the Agricultural Department would be able to turn out 30 trained teachers a year.

Another requisite for success is an Assistant Inspector of agricultural education who should be in the Education Department. His duty will be to inspect the agricultural classes and farms in all "vernacular" middle schools in which agricultural teaching is given and to see that the school farms are properly run. He must be an expert agriculturist as well as a trained teacher.

There is one point to which I wish to draw the Commission's attention. It is the necessity for a clear understanding of the difference between the schools of the Bulandshahr type controlled by the Agricultural Department in which agriculture is taught as a vocation, and the vernacular middle schools controlled by the Education Department in which agriculture is taught as an educational subject and part of a school curriculum. The two in no way clash. There is room for both types of agricultural teaching and the successful development of the second will lead to an increased demand for the first.

In the United Provinces purely vocational schools of the Bulandshahr type meet a distinct need. In these Provinces, especially in the Province of Agra, the system of land tenure has created a body of relatively small but substantial zamindars. Recent legislation has given them facilities for securing larger areas of land for their own cultivation. It is, in my opinion, of the utmost importance that their sons should be able to obtain instruction which will enable them to practise modern agricultural methods as soon as they reach the age at which this can be suitably given to them. Many boys of this class have a decided bent for agriculture. I want to see them encouraged to develop it to the full and not be forced to suppress it as they undoubtedly are in the institutions which give a purely literary education. These boys want something more than agricultural teaching in a middle school if they are to take their places as rural leaders and for this reason, as stated above, I consider there is need for a highly specialised technical training in schools of the Bulandshahr type as well as for agricultural teaching in middle school. I do not consider that the latter can take the place of the former.

Higher Agricultural Education.—(1) *Agricultural College.*—I now come to the position of the Agricultural College in the chain of agricultural education. It is an essential but very expensive link. For one thing without it the Agricultural Department will soon cease to function for want of trained staff. The present organisation, popularly known as the Agricultural College, combines the dual functions of a college and a research institute. For this purpose the laboratories and equipment are admirable. When the extensions now in progress are complete it will be equal, if not better than, any institution in the United Kingdom. The total capital expenditure on the buildings and equipment for research and teaching

laboratories, the farms, hostels, residencies and the like will amount to Rs. 16½ lakhs. There are separate laboratories for teaching and research, but with the exception of economic botany, both research and teaching in each of the five sections are controlled by the same officer. This is at the best a make-shift arrangement and an administrative device for getting more work done than is paid for. Like all such devices it is only partially successful. A separation of the two functions will be necessary sooner or later if a programme of research is undertaken commensurate with the economic needs of the Province. Such a separation has been forecasted in my proposals for the establishment of a section for crop-improvement. In this paragraph of my evidence, I deal entirely with the functions of the College as a teaching institution for agriculture.

I have been connected with the College for twelve years, first as a teacher and research officer and later combining these functions with that of Principal. My observations are, therefore, based on experience. The College has had many vicissitudes. In the early stages of its existence it suffered from all the mistakes which inexpert and inexperienced administration could make. As a result of more rational administration from 1914, it has settled down to a definite and useful work. Its functions are to give the sons of zamindars a training fitting them to manage their own lands and to provide recruits for the Agricultural Department.* At present it gives two courses of instruction (1) a four years course for the diploma of L. Ag., with an intermediate diploma controlled by the Board of High School and Intermediate Studies at the end of two years. The four years diploma course is, in all but name, a course for a University degree of B.Sc., in agriculture and (2) a second course of two years is a vernacular course. It is on similar lines to the course at the Bulandshahr school, but it is intended to cater for a different class, namely, the larger zamindar who is not educationally qualified for the four years diploma course. The two years vernacular course is popular and always full, although a greater part of the students in it belongs to a class who could be more suitably provided for at the agricultural schools when we have sufficient accommodation for them.

The Agricultural College will, I forecast, develop on the following lines:—

(1) The technical agricultural education of the larger landholders, providing at the same time for this class all the benefits usually associated with University education. It is not likely for some years that this class will be numerous enough to fill the college. As time goes on, however, there is reasonable expectation that far greater numbers will become educationally qualified for a University course. It should be the aim of the agricultural college to become the University of the land-owning classes.

(2) The training ground for the staff of the Agricultural Department and for technical departments in which a scientific training with an agricultural bias would be as suitable as, or more suitable than, a training in science or arts. The Co-operative Department is an example of such a department. The Oakden Committee whose report is before the Commission recommends in paragraph 51 that the recruitment of the staff of the Co-operative Department should be largely made from the graduates of the Agricultural College. This recommendation is a sound one. Training in agricultural science is an admirable preparation for the work among the rural population which the officers of Co-operative Department will have to carry out.

The officials of almost all departments in India are brought into daily contact with agriculturists of every class. In my opinion it would all be to the good if a larger proportion of these had a training such as given at the agricultural college. It would afford them a wider insight into,

*See Paragraph 154 of the Report on Agriculture in the United Provinces.

and give them a wider knowledge of, and sympathy with, the many problems and difficulties of the agricultural classes. Recruits who have received the type of University education in science and arts now given do not always possess these. If a larger number of executive officers such as Deputy Collectors and Tahsildars and even Police Officers were recruited from the Agricultural College, I think we should find agricultural progress accelerated.

I, therefore, advocate the development of the teaching side of the agricultural college on University lines.

To provide (1) University education for the larger landowners, (2) the training of such of the technical staff of the Agricultural and Co-operative Departments as require a University education in agriculture, and (3) the training of a proportion of the executive staff of other departments which come into close contact with the rural population. With regard to the latter it will be necessary for Government to fix a definite proportion of recruitment for the posts of Deputy Collectors, Tahsildars and possibly Police Officers.

The above programme would, I think, keep the college fully and usefully employed. As corollaries to this we should aim at the gradual separation of the research side by the creation of sections such for example, as I have proposed for crop improvement and (2) for unified control of all the teaching sections under the Principal, and (3) the gradual removal of the two years' vernacular courses to the agricultural schools.

(2) *Movements for improvement of the technical knowledge of students who have studied agriculture.*—This can be dealt with by establishing short courses of instruction in special subjects at farms and other centres where special work is being done.

The requirement of the moment in the United Provinces is instruction in intensive agriculture and the management of private farms where tube wells have been established.

We propose to meet this by establishing short courses of instruction by the Deputy Director and the farm staff at Shahjahanpur. In fact, we have already had a certain number of students for this course but its full development has been held up for want of suitable accommodation. This has now been arranged for. A grant for the erection of residential quarters for six students costing Rs.15,000 has been included in the Budget of 1927-28. This class of instruction can be given at the cattle-breeding farm at Muttra where facilities exist for short courses of instruction in cattle improvement and modern dairying.

Short courses can be established at practically every circle headquarters, the only additional expense being residential quarters for students which, as I stated above, is estimated at about Rs.20-25 thousand.

I have now given my views on the purely provincial development of education in relation to agriculture. They are summarised below:—

- (1) Wide extension of primary education;
- (2) An increase (say, of 20 per annum) in the number of middle vernacular schools giving agricultural instruction at a cost of Rs.4,000 per school, non-recurring and Rs.348 recurring;
- (3) Two more vocational schools of the Bulandshahr type at a total cost for each school of
Non-recurring, Rs.2.75 lakhs;
Recurring, Rs.30,000;
- (4) The development of the agricultural college on University lines under the unified control of the Principal, with the gradual creation of separate research sections for subjects of economic importance and the gradual removal of the vernacular courses;
- (5) Short courses of instruction in special subjects at selected farms, and other centres of agricultural activity for improving the technical

knowledge of students who have studied agriculture. Immediate developments possible are short courses for intensive cultivation at Shahjahanpur and instruction in modern methods of dairy work and cattle improvement at the cattle-breeding farm at Muttra.

Pusa.—I conclude my survey by considering the position of Pusa in the scheme of agricultural education for India as a whole.

This Province and other Provinces have agricultural colleges teaching up to a degree standard in agriculture. Each Province is able to meet its own requirements as regards its present provincial services. But I am inclined to think that no Province is making adequate provision for training officers to fill the higher posts in the Agricultural Department, namely, those now filled by officers of the Indian Agricultural Service. Our object is to make India self-contained and self-supporting in all matters connected with its agricultural development. As things are if we desire to obtain officers for the important posts of Deputy Directors we have to recruit from those who have attended agricultural courses overseas either on their own initiative or by the grant of study leave. Officers thus recruited suffer from the disadvantage of having received their agricultural training in a foreign environment. They are as a rule no better qualified than the graduates of provincial agricultural colleges who are recruited for lower posts, except, in those cases (which are rare) where long periods have been spent in post-graduate study.

We require to develop in India an institution to continue the training given at the provincial colleges by means of a higher general course specialising in agricultural training. If I may be allowed to adopt the common phraseology of educationists in India, we require a college teaching up to M.Sc. standard in agriculture. This will provide a training ground for the higher agricultural posts in the department and we shall no longer be thrown back on foreign recruitment as we are at present.

No Province can afford to make its own arrangements for such training nor would the numbers required justify the institution of such a course; but for the whole of India numbers will be forthcoming to fill a central college. The development at Pusa of a higher course in general agriculture appears to be the obvious solution. The existing arrangements for teaching at Pusa are inadequate. Training is provided mainly for specialist officers in the various research sections. The main need of the Provinces is for officers with an all-round agricultural training, who will be able to undertake the work of Deputy Directors.

The number of students at Pusa at present is small. The numbers taking the regular courses were as follows:—

	1924-25.*	1925-26.
Agricultural section	—	2
Chemical section	1	2
Mycological section	1	3
Entomological section	1	—
Botanical section	2	3
Bacteriological section	—	1
	—	—
Total	5	11
	—	—

Teaching is not and never has been regarded as one of the principal activities. I do not desire nor intend to depreciate the work that has been done there but I am bound to state my opinion that the result of the research carried out at Pusa in the last twenty years, except as regards the improvement of wheat, has had no effect on the agricultural development

* Scientific Reports of the Agricultural Research Institute, Pusa, 1924-25.
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of these Provinces; this is particularly the case with regard to the work of the agricultural section.

I advocate the development of Pusa as a purely teaching institution. In the natural course of events it seems clear that the main lines of research will have to be removed to provincial centres whatever course may be adopted with regard to their control whether it be provincial or central. Such a process has begun. Examples are the Institute of Plant Breeding at Indore, the Sugarcane Research Station at Coimbatore and the Institute of Dairying and Animal Husbandry at Bangalore.

The research activities of Pusa are bound to decline. There is danger of its splendid equipment not being utilised to full advantage. There is, however, a splendid future if it can be developed into a central college for the training of officers for the higher agricultural posts, particularly Deputy Directors.

QUESTION 3.—DEMONSTRATION AND PROPAGANDA.—The methods of demonstration and propaganda are described fully in Chapter VI of the Report on Agriculture in the United Provinces.* They have been evolved slowly as a result of twenty years' experience, have stood severe tests and enabled us to make progress. It is only necessary for me, in answering this question, to draw attention to a few points which require emphasis.

In the first place, by far the most successful and also the quickest method of influencing and improving the practice of cultivators and of inducing them to adopt expert advice, is to cultivate under departmental control a small area of village land either by improved methods of cultivation, or by growing on it improved varieties of crops. By this means the cultivators are able to satisfy themselves quickly of the value of the new methods and also, what is probably more important, of the possibility of carrying them out under village conditions. This is the principle underlying our demonstration work throughout the Province and the methods used in different localities are variations in organisation only.

A well-run demonstration farm exerts a powerful influence in the long run on the agriculture of the district in which it is situated, but it is slower in operation on cultivators than demonstration on village land for various reasons. For one thing, the amount of capital involved frightens them. It is necessary to point out here that success of all kinds of agricultural propaganda amongst the cultivating classes depends on first-class technical work. Where propaganda fails, it is almost always traceable to some fault in the details of technical work rather than in organisation. Organisation is important, of course, as it enables the best use to be made of the facilities available. First and foremost, what the cultivator needs and instantly responds to is a demonstration of superior technical skill.

As regards the organisation of demonstration, I am inclined to favour the system of demonstrating in groups of villages (5 is a convenient number and represents in Rohilkhand an area of approximately 2,500 acres), which has been recently worked out for the Rohilkhand Circle and the new Sarda Canal areas. It is not possible or desirable to lay down any hard and fast rule as regards details of demonstration as long as the fundamental principle is observed. An organisation that succeeds in the hands of one officer may fail in the hands of another.

The village in this Province is the self-contained agricultural unit as is the farm in western countries.

The method of carrying out demonstration in a group of villages is as follows:—

A member of the Subordinate Agricultural Service qualified by training for the particular work in hand goes to one of the selected villages and makes it his headquarters. He is not allowed to leave his group of villages without permission. This seems a small matter but it is important as

*Not printed.

those who know India will realise. It is necessary at first to go slowly in order to avoid suspicion that the ultimate object of the department is to acquire a good slice of the best village land for its own use. For this reason operations in the first year are usually confined to hiring a small area of from $\frac{1}{2}$ to 1 acre in one village for one year.

The demonstrator is provided with bullocks, improved ploughs and all the necessary tools for cultivation so as to interfere as little as possible with the ordinary routine of village work; he engages as part-time labourers a few intelligent youths of the village who ultimately become fieldmen and propagandists themselves. He proceeds to prepare the land for the crop, generally, in Rohilkhand, a crop of sugarcane grown by the improved methods worked out at Shahjahanpur. He gets on good terms with the cultivators, and makes preliminary arrangements for establishing a seed store and supplying new implements.

The result of the first year's work is watched with critical interest by the cultivators. At the end of the season requests for assistance and seed begin to come in. The demonstrator is kept busy giving advice and assistance.

The method has been developed in the Rohilkhand Circle under my personal supervision and I give a detailed account of two centres. The first is a recently established centre and the second is one in which the demonstration may be regarded as satisfactorily completed. I will first describe the recently started demonstration centre at Kisarwa in the Budaun district. Irrigation from a tube well and pumping plant is being supplied to parts of three villages, Kisarwa, Shitabnagar and Amgaon.

The water is supplied at Rs.1.10.0 per hour for a full discharge which works out to Rs.5 per 4 acre inches for each irrigation. This is approximately Rs.25 for the irrigation of a crop of sugarcane and Rs.10 for a crop of wheat. Unless intensive methods of cultivation were adopted the water would not have been used at these rates.

A demonstrator was sent there in 1924-25, half an acre of land was hired for one year from a cultivator for Rs.12. A variety of improved cane selected at Shahjahanpur and known as S48 was grown by improved methods. An excellent crop was obtained which I estimated at harvest time at 950 maunds per acre.

The produce of the indigenous canes in the neighbouring fields was estimated at 350 maunds. The crop attracted a lot of attention and the produce of the whole plot was sold for seed.

In 1925-26 the departmental plot was increased to 6 acres, one acre for sugarcane and the remainder for the production of wheat seed with a little fodder for the bullocks belonging to the demonstration area.

The cultivators in the three villages assisted by the demonstrator prepared small plots on 10 acres of their own land according to the new method. They got excellent crops, worth, it is estimated, Rs.5,400. They could not have obtained more than Rs.2,100 from their own cane grown by their old methods.

In 1926-27 there are 26 acres of intensively grown cane in the three villages. The value of it is estimated at Rs.10,400 after making allowance for the fact that the cultivation of some of the new converts to our methods is not so good as that of the more experienced hands.

In addition to cane there are 525 acres of C46 wheat in the three villages estimated to produce an increased return of Rs.15 per acre.

The financial results of our work have put the cultivators of these villages on their feet. They have paid all their old debts and are probably, if the truth was known, cheerfully borrowing money again. But apart from the financial results, the evidence of agricultural activity and the air of prosperity is most encouraging. A seed store has been opened and the group of villages has become a centre of agricultural teaching for the whole district.

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In 1925-26 the cost of Kisarwa demonstration to the department was:—

	Rs.
One demonstrator on Rs.65	780
One ploughman on Rs.12	144
Grant for running the tube well and pumping plant and demonstration	2,000
Receipt from sale of water and the produce of the demonstration plots	1,629
Total nett cost ...	1,295

The capital expenditure on equipment for the experimental plot was:—

	Rs.
Bullocks	400
Implements	121
	521

This description gives a fairly accurate picture of the course of events in establishing one of our group demonstration centres. I now proceed to give an account of a group of villages in which demonstration was started some years ago and except for occasional assistance may be regarded as complete.

In 1918-19 a small plot 1.25 acres of Shahjahanpur sugarcane was grown by the department in a village called Mundia in one best sugarcane *parganas* (Baragaon) of Rohilkhand. The group of seven or eight villages of which Mundia is the centre at the time our demonstration was started had 64 sugarcane mills and eight installations for concentrating juice into raw sugar (known as "bels"). These dealt with 30,780 maunds of juice.

In 1926-27 there are 146 mills as well as two large power mills and 18 bels and it is estimated that they will deal with 82,000 maunds of juice.

The total of area under sugar in 1918-19 was:—

Indigenous varieties	236
Shahjahanpur varieties	1.25
	237.25

In 1926-27 the area is:—

Indigenous	38
Shahjahanpur canes	235

273

Confirmation of the financial results of our work in Mundia is found in the fact that the income tax paid by the *pattidars* of the village who cultivate land of their own and handle the whole crop of the tenants in the group villages has risen from Rs.168 to over Rs.1,000 per annum.

The group of villages has been the centre from which the cultivation of better varieties of sugarcane has spread throughout the *pargana*. The latest official returns show that, out of a total area of 4,120 acres, 3,285 acres or 79 per cent. are sown with the superior varieties selected by the Agricultural Department.

I have gone into some detail in these two cases because this method of demonstration is one which I propose to use in developing the new Sarda Canal areas.

The methods described above aim at improving the standard of agriculture of the cultivator with an average holding. The zamindar who is able to invest money in farming is an important factor in rural development. The zamindar interested in agriculture opens what is known in these Provinces as a private farm. This in practice means that he cultivates a considerable area of *sir* or *khudkasht* land by modern methods. Twenty years ago there was not a single privately-owned farm in existence. The latest returns show 621 managed with the assistance of the Agricultural Department. Approxi-

mately one-third are over 50 acres, one-third between 25 and 50 acres, and the remaining one-third small farms under 25 acres. All are adopting methods recommended by the department. I do not think it impossible to overrate their importance as a method of supplementing the demonstration work carried out by the Agricultural Department. We are encouraging them by grants-in-aid to undertake work of definite utility, chiefly seed production. In 1925-26, a sum of Rs. 25,000 was voted for this purpose. This was raised in 1926-27 to Rs. 35,000, and proposals have been made for a grant to Rs. 50,000 in 1927-28. The grants are from Rs. 2,000 to Rs. 3,000. Those receiving a grant are, as a general rule, required to enter into what is known as a "seed contract," that is, a legal agreement to grow and sell to the department for five years at fixed rates a quantity of seed specified in the agreement. Grants are also given occasionally for other purposes, such as the introduction of modern methods of dairying, cattle breeding and the like. The majority of our grants are, however, for seed contracts. We are, by means of private farms, demonstrating improved methods of agriculture and providing a non-official agency for seed production.

Up to the date of writing, grants-in-aid have been made to 30 farms and seed contracts executed for the production of 20,400 maunds of pedigree seed.

The zamindar who is contemplating capitalistic farming is more influenced by a well run and financially successful demonstration farm than by anything else. It is for this reason that I am in favour of making our demonstration farms work at a profit although I am aware that this view has been adversely criticised. There are certain disadvantages for instance, it rules out experimental work in some cases where it is essential. Balancing the advantages against the disadvantages, I am so convinced of the value of the demonstration of financial success in inducing the zamindar to take up farming that I consider the practice should be continued.

The Hardoi district which it is hoped the Commission will visit is the best example of the effect of a well-run demonstration farm on the agriculture of a district. The results are described in paragraph 175 of the "Report on Agriculture in the United Provinces." (See Appendix on Page 42 (i).)

QUESTION 4.—ADMINISTRATION.—I have indicated, in discussing the organisation of research in my answer to Question 1, the manner in which the Government of India can assist the Local Government, i.e., by capital and recurring financial assistance towards specific schemes. Definite proposals have been put forward for assisting research on crop improvement the rapid development of which I regard as a main factor in determining the rate of agricultural progress.

I am of opinion that the Government of India should undertake also to provide in every Province an agricultural statistical expert and a small staff (1) to deal with the material collected for the preparation of forecasts and other returns of agricultural importance, (2) to examine the mass of valuable material already in existence for the study of agricultural economics and (3) to initiate and carry out local economic inquiries. I shall deal more fully with this proposal in answer to Question 26. I wish, however, to point out at this stage that the statistics and forecasts are required mainly for an All-India purpose. There has been a tendency of late for the Director-General of Commercial Intelligence and Statistics to increase the number of forecasts and returns. If these were given the full attention they ought to have, this work would seriously restrict the technical work of the department. The Legislative Council has no sympathy with statistical work and would not vote the money necessary to expand it. The only division on the agricultural budget in 1926 was on a proposal to appoint a clerk for statistical work on cotton required by the Cotton Ginning and

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Pressing Factories Act. In this division the member for the Upper India Chamber of Commerce voted against Government. The expenditure was so strongly opposed that I shall not recommend similar demands being placed before the House.

(b) As forecasted in a previous answer my view is that agricultural research should be developed provincially and not centrally. I consider that it should be carried out under the control of the Ministers and that each Province should aim at becoming self-supporting in all branches of agricultural research. Any proposals for central development would be misunderstood. It would be regarded by many as contrary to the spirit of the Reforms to transfer the development of agriculture to Ministerial control and then to say in effect: "You cannot organise the most important part of it; we are going to do it for you." The Government of India can and should provide more money than it does for agricultural research. The total expenditure of the Central Government on the Pusa Institute is Rs. 8.36 lakhs. This does not include veterinary research but can be taken as an index of the Government of India's financial contribution to the kind of research with which my department is concerned and which I am discussing. The contribution of the Government of India should take the form of assisting provincial Ministers to carry out their own schemes.

The increase of the scientific staff of the Government of India stationed at Pusa and working more or less out of touch with the local aspects of the problems they are investigating would not further agricultural development in the Provinces. I consider it has been proved by experience to be an ineffective method. Everything in India depends on being on the spot.

The method of utilising an increased scientific staff controlled by the Government of India would have to be one of the two following methods.

The establishment of research stations in the Provinces under the control of the Government of India and directed by the Agricultural Adviser. He might be assisted by a committee of management on which the Province was represented by the Director of Agriculture. An institute of this kind would be designed to meet the requirements of more than one Province. If it could be proved that it would do so effectively, this on the ground of economy would be an argument in its favour, but this cannot be admitted. In the first place, I shall consider a possible development, i.e., the establishment of a station for the production of better varieties of rice. If such were established, it would almost certainly be located in Eastern Bengal where the crop is one of major importance. There is no guarantee that the problems of this Province would receive adequate attention. In fact it is extremely likely that they would not. The Minister of Agriculture in the United Provinces would have no direct means of enforcing due attention to the needs of this Province, if the matter of the improvement of the rice crop was pressed on him in Council. He could only make representations to the Government of India and wait for results. A central institution located in another Province and not responsible to the local Council would have no difficulty in finding explanations, any number of them. The net result of central institutions would be that the Minister's powers of controlling and directing the agricultural development in his own Province would be restricted. In addition to this, the presence of agricultural workers in a Province who are not under the Minister's control would certainly not tend to promote smooth working.

Besides this I do not think the proposal is a good one on technical grounds. To follow out the hypothetical case I am considering, i.e., a central institution for rice. The production of new varieties of all crops with the exception of sugarcane for which there are special reasons is best carried out under local conditions. It is very unlikely that races produced in Eastern Bengal for instance would suit conditions in the United Provinces

as well as races produced here. At any rate it would involve delay for experimental work on selection.

My view is that for all the problems of which I have taken rice as an example there is ample scope and justification for more than one team of workers. Our rice crop for example is valued at over Rs.41 crores and is second in importance to wheat. We are fully justified in this particular case in having workers in the United Provinces.

The second method of employing an increased staff is to loan the services of specialist officers for a definite work for a term of years contributing at the same time a proportion of the expenditure required for equipment.

This is practically what I have proposed in discussing the establishment of a section of crop-improvement in the United Provinces. For administrative reasons and for developing the sense of local responsibility for local problems it would be better probably to guarantee the amount required and leave Local Governments to recruit their own officers, although this is not a matter of major importance. In this connection I again state that it is essential for the Government of India to retain the right of inspecting the work they subsidise by means of an Agricultural Commissioner in order that they may know that the money is being used for the purpose for which it was given.

QUESTION 7.—FRAGMENTATION OF HOLDINGS.—This subject has been dealt with in Chapter XX of the Report on Agriculture in the United Provinces.* I am certainly of the opinion that a legal remedy is not suitable in this Province. The advantages of scattered holdings are obvious to the cultivator. Of the disadvantages he is not yet fully aware. It is therefore largely a matter of education and this aspect is being taken up by the Co-operative Department.

My own view is that provided the size of the entire holding is economic the scattering of fields is not so great an impediment to the work of my department as it is popularly supposed to be.

Where tube wells have been constructed for supplying water to villages, we experience the maximum disadvantage of small fields but even here we have been able to overcome them in cases where we have undertaken concentrated village demonstration. I am willing to admit our difficulties would be less if we had larger fields, say, fields of 5 acres to deal with.

There is a great deal more co-operation amongst the villagers in this Province as regards interchange of labour than one would at first sight suspect and, from the point of view of my department, the village and not the holding is regarded as the unit for propaganda and demonstration work.

If any steps are taken at the present, it should be to prevent further reduction in the size of holdings but this is an exceedingly difficult matter to carry out.

QUESTION 8.—IRRIGATION.—My department is concerned with the development of well irrigation and I shall, therefore, confine my remarks to that branch of the subject. The proper department of Government will deal with canal irrigation.

As stated in the United Provinces memorandum, my department contains an Engineering Section especially equipped for dealing with problems connected with well irrigation. The technical controlling staff consists of:—

- 1st Agricultural Engineer (Rs.500—50—1,200).
- 2nd Agricultural Engineer (Rs.500—50—1,000).
- 3rd Agricultural Engineer (Rs.500—50—1,000).

The first and second Engineers are permanent and pensionable officers and the third is on a short-term agreement for five years. In addition, there are four Assistant Agricultural Engineers with lower qualifications

*Not printed.

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on a scale of pay (Rs.250—25—500). None are members of the Agricultural Services. This, I think, is a mistake. All expert officers of the department should be on the same terms of service.

The budget provision for 1926-27 was Rs.3.41 lakhs.

The work is divided into two parts—

- (1) The improvement of existing masonry wells.
- (2) The construction of tube wells and the installation of power pumping plant.

The staff for the improvement of existing masonry wells deals with over 600 wells per annum. In 1925-26 the total borings made were 673, out of which 610 were successful. The distribution of boring staff varies from year to year but each district, where well boring is possible, is provided with a borer and in some cases two or three borers are placed in one district temporarily when the demand justifies such a course.

The details of the staff employed exclusively on the improvement of existing masonry wells in 1925-26 is given below:—

1	well engineer on Rs.160—5—210 at Rs. 185
4	„ „ „ Rs.110—5—160.
1	„ „ „ Rs.155.
1	„ „ „ Rs.125.
1	„ „ „ Rs.110.
1	„ „ „ Rs.75.
1	driver on Rs.35.
3	drivers on Rs.30 each.
21	expert borers on Rs.35 each.
10	„ „ „ Rs.30 „
20	„ „ „ Rs.25 „
51	mates on Rs.12 each.

The total expenditure in 1925-26 was:—

	Rs.	a.	p.
Salaries of well engineers	6,721	9	0
Pay of drivers, borers and mates	26,399	10	0
Travelling allowance and contingent expenditure	6,152	15	3
Purchase of plant, repairs and renewals	51,683	12	2
Miscellaneous expenditure	1,355	12	0
Total	92,313	10	5

The expenditure in 1925-26 (Rs.92,313) was above normal and included non-recurring expenditure of Rs.14,000 for the purchase of new boring equipment which did not come into operation during the year. The total amount spent on the operations actually carried out in 1925-26 was Rs.78,313. The number of feet bored in connection with the improvement of 673 wells was 38,056 feet. The cost per foot was Rs.2.05.

The receipts amounted to Rs.11,263 or Re.0.29 per foot. Government, therefore, subsidises well boring at the rate of Rs.1.76 per foot.

The well owner pays the following charges:—

- (1) Cartage of tools and equipment from the place where the borer has been working to the site of the well to be bored.
- (2) Wages of 10 or 12 coolies required until boring is complete.
- (3) Footage allowance to borer at Re.0.1-6 per foot for boring up to 50 feet and Re.0.2-0 for boring beyond that depth.
- (4) Cost price of pipes and cutting shoes (if any) left in wells. The present rates are:—
 - 2½-inch pipe at Re.0.14-0 per foot.
 - 2½-inch cutting shoe at Rs.6-2-0 each.
 - 4-inch pipe at Rs.1-4-0 per foot.
 - 4-inch cutting shoe at Rs.10 each.

The Government has definitely accepted responsibility for developing underground water supplies for irrigation purposes. We are advised that the best method of doing this is by means of strainer tube wells and power pumping plant. The main work of the Agricultural Engineering Section is the installation of these. Progress is dealt with year by year in Chapter IV of the Annual Administration Report of the department and a general account is given in Chapter VII of the Report on Agriculture in the United Provinces. Two hundred tube wells with engines and pumping plant have been completed protecting, it is estimated, over 30,000 acres and irrigating three-fifths of that area. The present staff and equipment can be expected to complete 50 annually, adding 7,500 acres to the protected area.

The conditions under which the construction of engines and pumping plant are undertaken are as follows:—

(1) No charge is made for the services and advice of the expert officers nor for the preliminary test borings. Plans and estimates are prepared free of cost.

(2) The cost of construction is borne by Government who provides the services of mechanics as well as the boring equipment required. When the estimate has been accepted, the money must be deposited with the Agricultural Engineer before work is commenced. This rule is strictly enforced.

(3) The zamindar pays for the strainer tube and the engine and pumping at cost price, that is, for the actual material left in his possession on the completion of the work.

(4) *Taccavi* grants are freely given up to approximately the entire cost of the well if necessary and grants-in-aid up to a maximum of Rs.3,000 are given in special cases to those who undertake seed contracts or to lease land for demonstration purposes. The grant of *taccavi* is made by the district authorities on the recommendation of the Agricultural Department. There is sometimes delay in the enquiries required. Attempts have been made to simplify the procedure, but it is a matter which is still capable of improvement.

(5) In cases of failure the money advanced is returned to the zamindar who incurs no expense.

The following figures give a reasonably accurate estimate of the "all in" cost of a 15 inch strainer tube well and pumping plant giving 35,000 gallons of water per hour. This would irrigate 150 acres in one season and fully protect 250 acres.

Paid by zamindar	Rs.8,000
Overhead charges borne by Government (1925-26) ...	Rs.4,987
Depreciation (10 per cent.) and interest (6 per cent.) on capital invested in boring equipment	Rs. 960

Total Rs.13,947

Government subsidise the construction of tube wells and pumping plant to the extent of Rs.6,000 per well exclusive of assistance in the form of *taccavi* and grants-in-aid. The costs given above do not include any profit on the undertaking, and in my opinion private firms would require something of the order of Rs.16,000 per well for similar work. It will be seen that the exploitation of underground water supplies is expensive, and also that this Government are providing generous assistance to those who wish to use it. This is justified by the increased prosperity rendered possible in areas commanded by tube well irrigation.

The cost per acre of a single irrigation by means of tube wells and pumping plant differs widely. This is expected when the number of variable factors influencing cost are considered. An average figure is not of great value. The Agricultural Engineer is of opinion that Rs.4 per acre for the

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running cost of a single irrigation may be taken as a rough approximation, but tube wells and pumping plant have been installed giving water at Rs.2 per acre and others costing as much as Rs.8 per acre.

The following are actual figures taken from the accounts at the Shahjahanpur farm for a single irrigation of the *rabi* crop in December, 1926.

The well is not a strainer tube well but a masonry well bored with a plain pipe giving an estimated discharge of 10,000 gallons per hour with a lift of 38 feet. The discharge is not yet accurately known. The engine is a H type 16½ B.H.P. Ruston Hornsby crude oil engine fitted to a 6 inch centrifugal pump. This is larger than actually required for the present discharge. The water is distributed through masonry channels so that there is little or no loss from the discharge pipe to the field.

Area irrigated, 20.19 acres.

Time, 186 hours.

Crude oil used, 73 gallons.

Kerosine oil, 12 gallons.

Cylinder oil, 4.33 gallons.

Castor oil, 11¼ seers (23lb.).

The cost of materials at the farm was as follows:—

Crude oil, 9.58 annas per gallon.

Kerosine oil, 15.62 annas per gallon.

Cylinder oil, 42.00 annas per gallon.

Castor oil, 14.5 rupees per 82¼ lb.

The running cost of a single irrigation works out to Rs.5-7-0 per acre, including the wages of the driver (1 per day) and a man and boy for distributing water in the field (at a total of 15 annas a day).

Experience has established certain facts regarding the economics of tube well irrigation. It does not pay unless intensive cultivation is adopted and unless some high priced crop such as sugarcane, potatoes or tobacco is grown. It is not a business proposition to irrigate only wheat or other *rabi* crops grown on the indigenous system with yields of 15 maunds per acre except in cases where the discharge is high and the lift low.

Tube wells are a powerful influence in the adoption of intensive cultivation. From a technical point of view, that is, from the point of view of demonstrating intensive methods of cultivation and also from the point of view of economy in construction, it would be better to concentrate work in one area for a number of years. Such areas are Gorakhpur and that part of Kheri not served by the Sarda Canal. This in the present circumstances is a counsel of perfection. As long as the money is voted by the local Legislature, we are obliged to consider individual applications on their merits. The only way in which a large scheme of concentrated construction could be carried out would be for the Government of India to subsidise the undertaking.

A scheme in Gorakhpur for a central station distributing electric power for pumping from ten large tube wells is making satisfactory progress. Six borings have been completed and the strainer tubes put in. Three have been tested and give on an average 40,000 gallons an hour. Before estimates are prepared for the installation of electric machinery it is necessary for all the wells to be thoroughly tested and the discharges and lift accurately known. The wells are, therefore, put into commission as ready with temporary pumping plant loaned by the agricultural department. It is not at this stage possible to give an accurate estimate of the final cost of pumping by electric power.

Expansion is undoubtedly required. Underground water-supply is the only unexplored source from which the irrigated area of the province can be increased. The United Provinces with its large submontane tract is more suitable for this form of irrigation than any other part of India. The

work is difficult to organise and to control with a number of widely scattered projects in hand at one time. Constant expert supervision is necessary for success and economy in construction.' I consider that the salaries now given to the controlling officers will not attract men of sufficient ability and organising capacity to expand the work on the scale necessary for any real effect to be made on the agriculture of the province. I am of the opinion that there is a very real danger of a break-down in the event of casualties to any of the controlling staff.

QUESTION 9.—SOILS.—(a) In this connection I wish to point out the necessity of adequate drainage in that part of Rohilkhand which is served by the Sarda Canal. This is now, even without irrigation, the best sugarcane tract in these Provinces and the only one in which the manufacture of white sugar can be carried out profitably by the indigenous system of open pan boiling. Considerable progress has been made as regards the introduction of better varieties of cane. An intensive campaign of demonstrating intensive methods of cultivation is arranged for and will commence as soon as the Sarda Canal starts work. Nothing is so detrimental to the quality of sugarcane as badly drained soil. Drainage is of special importance in this tract over a great part of which the sub-soil water level is higher than it is in the irrigated tracts elsewhere in the Province. It has risen 10-15 feet in recent years as the result of copious monsoons. The question is receiving the attention of the Canal Department and large sums are being spent. I only draw the attention of the Commission to this, as it is, in my opinion, the most important drainage problem in the United Provinces.

(a) (ii) For many years both the Imperial and Provincial Departments devoted a large portion of the time of their scientific officers to the question of the reclamation of alkali *usar*. Valuable information was collected with regard to the movement of salts in the soil but no practical methods of reclaiming alkaline *usar* were worked out. Two experimental stations for the special study of this problem were maintained by the provincial department, one in the Aligarh district and one in the Cawnpore district. After 20 years' continuous work no methods were devised which could be profitably employed, for growing crops. The only possible chance of successfully utilising the bad type of alkaline *usar* found in the United Provinces is to grow certain type of trees and the experiment stations were, therefore, handed over to the Forest Department who have obtained a considerable success in their experiments.

My view regarding the question of reclaiming alkaline *usar* soils for agricultural purposes is that the chances of success are so small and the cost of the undertaking so high that the resources at present available for development are better employed in increasing the productivity of normal agricultural land the improved cultivation of which has every prospect of an increased return of 50 to 100 per cent.

(b) (i) I am not sure that I understand what is meant by this question. I have no knowledge of any improvement other than that brought about by the introduction and proper use of irrigation water and improved methods of cultivation.

(b) (ii) I have closely examined one area not in this Province but in the Gurgaon district of the Punjab in which marked deterioration by the spread of alkali was noticeable. This was on the Agra Canal. I should say that it is undoubted that some soils on the older canal systems deteriorated from alkaline formation some years after the canals started. This was long before my arrival in India and I have no knowledge of any appreciable deterioration in recent years.

QUESTION 10.—FERTILISERS.—I dealt with the question of the increased use of fertilisers in the material supplied for Chapter XV of the Report

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of the Indian Sugar Committee. The position has not altered since that chapter was written, and all that is stated there applies with equal force to-day. Prices of fertilisers have fortunately dropped and the surplus production in other countries of all kinds of nitrogen fertilisers makes the position of India better as regards sources of supply.

It is not necessary for me to repeat the arguments accepted by the Indian Sugar Committee. I will only say again that if the urgent demand for increased food production is to be met and the full benefit of extensions of irrigation is to be realised it is essential that a supply of fertilisers should be available at reasonable rates.

The intensification of agriculture on which the advance of India depends cannot be brought about without them. The first use will undoubtedly be for highly priced crops such as sugarcane, potatoes and tobacco.

The Indian produced fertiliser most commonly purchased in the bazars is oilcake meals of various kinds. As pointed out by the Indian Sugar Committee, the export of oilseeds is a serious drain on the nitrogen supplies of India. Their recommendation on this should be considered.

Nitrate of soda, sulphate of ammonia and calcium cyanamide are imported. Various agencies are conducting suitable propaganda to extend their sales.

The question of preventing fraudulent adulteration raised in sub-section (b) of this question needs attention, not so much from the point of view of adulteration as from the point of view of seeing that the chemical substances imported and sold as manure are of standard quality. It is unlikely that compound fertilisers will come into general use in India for many years.

The increased use of standard substances such as Am_2SO_4 , CaCN_2 , NaNO_3 , superphosphate and potash is likely. It is the duty of Government to see that inferior quality material is not dumped into India or if it is that it is sold on a nitrogen phosphate or potash basis. I do not think it is possible to attempt the control of small parcels of oilcake meal sold in the bazar at present. It is quite easy to judge the purity or otherwise by inspection. I should, therefore, be inclined to recommend an All-India Act as regards fertilisers only on the lines of the English Fertiliser and Feeding Stuffs Act and to limit its application by rules to imported fertilisers or fertilisers manufactured in bulk in India for the present.

The technical organisation exists. The Agricultural Chemists to Local Governments can undertake the work of provincial agricultural analysts and the Imperial Agricultural Chemist can be final referee in cases of dispute.

The methods of analysis published by the Pusa Institute can be made the official methods.

(c) It is already proved beyond doubt that phosphates, nitrates and ammonia salts, and potash are beneficial. What requires investigation is the method and economics of their application in India. This has not been sufficiently investigated. The use of such fertilisers has only just become possible. We know pretty well with regard to sugarcane the amount of nitrogen in the form of organic manures that must be applied for intensive cultivation and the best time to apply them, but we have not investigated the methods of applying an equal quantity of nitrogen as sulphate of ammonia or nitrate of soda. We do not know with certainty the effect of potash and phosphate on the quality of the various crops. All these points require investigation. I wish, however, to emphasise that such experiments to be conclusive are expensive. Reliable results will not be obtained by carrying out isolated experiments on small areas here and there.

It is essential that all experiments conducted with fertilisers should be carried out in such a manner that the probable error of the experiment can be determined.

QUESTION 11.—CROPS.—I have already drawn the attention of the Commission to the necessity of a strong section devoted entirely to crop-improvement. I have given the details of the organisation and the estimates of expenditure.

I am not technically qualified to lay down what procedure should be followed. As the result of experience, I should forecast that selection from the existing mixtures in the case of crops not yet investigated will in the hands of a competent worker lead to the quick production of varieties, possessing sufficient superiority to give an immediate increased production. This will be followed by the production of new varieties by breeding. This process is much more difficult and the results not so certain. It is, however, the fundamental method of producing better varieties and the initiation of intensive work should be delayed no longer.

Our extensive seed distribution system cannot be fully used for the benefit of the cultivator unless and until we have a wide range of better varieties of all crops to distribute.

An extensive organisation for the production and distribution of pure seed has been built up from small beginnings in the United Provinces. It is working well and is on a sound financial basis. The present conception of seed distribution is that it is a service for the benefits of which the users should be willing to pay a small premium in much the same way as the users of municipal water are willing to pay a premium for a commodity which can be obtained for nothing if purity and quality are not considered.

Over a long series of years (approximately 17) including years 1921-1922 of violent fluctuations in prices seed distribution has been carried on at a profit although in one year when the market was falling rapidly there was a loss. This is proof of two things:—

(1) That the business is organised on sound financial lines.

(2) That the purchasers are not asked to pay too high a price for the benefits derived from the use of departmental seed.

The following facts are of interest in the latter connection. The price of departmental wheat seed when all penalties for the non-fulfilment of contracts for payment are enforced is practically never more than 12 annas per maund over the market rates for wheat. In England the Government charge 35s. per cwt. for Yeoman II wheat* and farmers charge from 15s. to 25s. for 2nd year named wheat seed when the market rates are 12s. 11d. per cwt., for f. a. q. home-grown.

The seed distribution organisation in the United Provinces is capable of indefinite expansion not only in the hands of the Agricultural Department but also by other agencies such as Co-operative Societies for the production and sale of improved seed, and also by the owners of private estates.

I consider it is a *sine qua non* that production and distribution should be carried out by the same agencies, that is to say, if a society undertakes to distribute seed it should also undertake to produce seed. In our system production and distribution are intimately connected. We increase our stocks by the repurchase of seed distributed to selected growers whose crops are inspected.

The production of pure seed is the important part of the scheme. The actual distribution is simple. It is in connection with joint production and distribution that the Agricultural Department wants help from other agencies in order to reach its objective, which is that pure seed of better varieties of crops should be placed within the reach of every cultivator in the province.

Previous to 1922, the system of distribution was on a cash basis, that is, the seed was sold at sowing time and either paid for on delivery or the price was recovered at harvest charging the ordinary *taccavi* rates of interest ($7\frac{1}{2}$ per cent. per annum.)

*See also Question 34,221, Page 87.

This system worked well as long as operations were limited but it had certain drawbacks:—

- (1) Bad debts were too frequent.
- (2) No provision was made for increasing the stock of seed and operations were confined to the quantity of seed produced at the Government farms.
- (3) In years of violent fluctuation in prices there was risk of loss to Government.

After a full examination it was decided to develop the issue of seed to cultivators on the grain *sawai* system, an indigenous system which when stripped of objectionable features introduced by the *hania* is generally acceptable to the cultivator.

The system consists of payment in kind for the seed given out. To every maund of seed taken at sowing time the cultivator brings back at harvest time 1½ maunds. The normal price of one maund at sowing time is equal to the price of 1½ maund at harvest time in the country districts where seed is distributed.

The small cultivator is seldom in a position to buy for cash payment. The grain *sawai* system encourages him to come forward for good departmental seed instead of relying on inferior seed obtained in the bazar at a high rate of interest. It is also an advantage to the department which automatically increases its stock of seed and is able to realise the amount of seed due at harvest time much easier than cash. By inspection of crops it is possible to maintain the purity of the stock.

A system of accounts has been standardised for use in connection with *sawai* seed distribution and has been worked out and is in use throughout the province.

A translation of the *sawai* agreement is given below. It will be seen that the groups of cultivators become jointly responsible. It is really a form of co-operative purchase.

"We the zamindars and cultivators named below beg to submit our application in accordance with Act XII of 1884 for certain quantities of seed as noted against our respective names, or whatever the Deputy Director of Agriculture is pleased to grant us for sowing purposes from the.....seed depôt and we promise to hold ourselves responsible jointly and severally to pay off the principal together with *sawai* interest and to observe the conditions mentioned on the reverse of the application which we have clearly understood.

1. Serial No.
2. Name of the applicant, together with father's name, caste and residence.
3. Status of the applicant, cultivator or zamindar.
4. Total area under cultivation.
5. Rent or revenue.
6. Kind of grain.
7. Quantity of grain required.
8. Signature of applicant.
9. Quantity of grain issued.
10. Signature of the issuing officer.
11. Remarks.

Attesting signature of the *Patwari*.

BOND.

"(1) We will use this seed for sowing purposes only and pay the principal, together with *sawai* interest (25 per cent.), from the produce of the crop for which we take the seed.

"(2) That we will pay off the principal, together with the *sawai* interest, at 25 per cent., either in kind or in cash. In case of payment

in cash, we shall pay the price of seed with *sawai* interest at the rate which may be prevalent in the nearest big market at the time of payment, for seed of the best quality of the kind which we have taken. If payment is made after the 31st of May, then the price will be fixed at the rate which prevailed on 31st May. This rate will be determined by the officials of the Agricultural Department. In addition to this price, we will pay extra annas 12 per maund to Government.

"(3) If payment of principal with *sawai* interest is made in kind the seed returned shall not be inferior to that which we have taken. If the seed is adjudged inferior by the officials of the Agricultural Department, the said department shall have the right in accordance with clause No. 2 of the bond to realise the price with a premium of annas 12 per maund in lieu of the payment in kind.

"(4) That as soon as the crops are threshed we shall send the seed (principal with *sawai* interest) or its price in cash to the said Seed Depôt. If payment is in kind we shall send it on our own carts to the said depôt.

"(5) That we shall pay in full the *rabi* demand, principal with interest before 31st May, that for *kharif* before 31st December. If the whole or any part of the price due remains unpaid after the expiry of the date fixed for the payment of the dues, interest at Rs. 7-8 per cent. per annum shall be charged on the price of the grain remaining due.

"(6) That if we take one or more bags from the department for taking away the seed, we shall pay for it in advance at current rate per bag.

"(7) That we, the applicants, shall be jointly and severally responsible for payment of the total demand. If the whole or any part of the total demand is left unpaid, then the Deputy Director of Agriculture shall have the power to recover it from the movable and immovable property of all or any one of us, or have the amount recovered through the Collector or Deputy Commissioner as arrears of land revenue. We have fully understood all these conditions and have duly received the seed entered in column 9 of this bond."

We have within the last two years utilised private farms for the production of pure seed. This method promises well, but it is rather early to make a definite statement. Grants-in-aid not exceeding Rs. 3,000 are given to the persons who already own or undertake to establish private farms on lines approved by the department, and in return for the grant the owner undertakes to grow certain varieties of crops and to sell for five years to the department at harvest time a specified quantity of seed. The amount is generally 200 maunds of wheat, but the conditions will be varied as the need for other seed arises. The terms are generous, and I am not aware of any other country in which such assistance is given to encourage intensive farming and seed production. We shall, if we are able to do so, stiffen up the terms of the contract. An example of a seed contract with the owner of a private farm is given below.

"An Agreement made between Sahu Shankar Sahai, son of Sahu Bhagirath Sahai, caste Vaish, resident of village Billari, in the district of Moradabad of the one part and the Secretary of State for India in Council (hereinafter called the Secretary of State) of the other part. WHEREAS the said Sahu Shankar Sahai has applied to the Government of the United Provinces of Agra and Oudh for a grant of Rupees three thousand to assist him in maintaining and cultivating his seed farm described in the schedule hereto AND WHEREAS the said Government has agreed to make the said

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grant upon the terms and conditions hereinafter appearing. AND WHEREAS a grant of Rupees three thousand (the receipt of which the said Sahu Shankar Sahai hereby acknowledges) has been made him by the said Government. NOW IT IS HEREBY AGREED between the parties hereto:—

(1) During the term of five years from the date of these presents the said Sahu Shankar Sahai will grow on his said farm sugarcane, wheat and cotton of such kinds as the Director of Agriculture of the said Government may specify upon such areas of his said farm as the said Director of Agriculture may require.

(2) During a term of five years from the 30th December, 1925, the said Sahu Shankar Sahai will every year not later than the first week of May sell and deliver to the said Government, if so required, not more than 200 (two hundred) maunds of Pusa No. 4 wheat grown in such fields, or on such parts of his said farm as may be approved by an official deputed for the purpose by such Director of Agriculture as aforesaid and grown in such manner as such official may require and will allow the said official to remove from such fields or such part of his said farm all plants of wheat not of the kind known as Pusa No. 4, and will sell and deliver such wheat upon the term and subject to the conditions hereinafter appearing.

(3) For every maund of wheat sold by the said Sahu Shankar Sahai to the said Government in accordance with the terms of the second clause of this agreement the said Government will pay him at the market rate current in the week in which the same is delivered, or, in case of dispute concerning the rate then current at the rate of price for such wheat in the district of Moradabad in the first fortnight of May as published in the "United Provinces Gazette."

(4) The said Sahu Shankar Sahai will deliver such wheat in bags containing $2\frac{1}{2}$ (two and a half) maunds each, a maund being for the purposes of this agreement reckoned as $82\frac{2}{7}$ (eighty-two and two-sevenths pounds). The said Government will pay the said Sahu Shankar Sahai for the bags in which wheat is delivered, such price as such Director of Agriculture may determine to be the current price for bags of the kind.

(5) If the said Sahu Shankar Sahai makes default in delivering the full quantity of wheat in accordance with the terms of clauses two and four hereof he will pay to the said Government as compensation for such default a sum of rupees two annas eight for every maund (of the quantity specified in clause 4 hereof) by which the amount delivered by him falls short of the amount specified in clause 2.

In witness whereof the parties hereto have hereunto set their hands the day and year first above written.

(Sd.)

(Sd.)

"

In 1926, 127 seed stores were operating in the United Provinces and distributed 105,052 maunds of improved seeds. Most of the stores are hired buildings in the bazaar. We are gradually replacing these buildings in which storage is frequently unsatisfactory by central seed stores constructed according to a standard plan.

By March, 1927, 19 central seed stores will have been constructed. Each seed store holds 2,000 maunds of grain. The recurring and non-recurring expenditure on each store is as follows:—

	<i>Non-recurring.</i>					<i>Rs.</i>	<i>Rs.</i>
Land	500	
Equipment	500	
Building	5,000	6,000

	<i>Recurring.</i>	Rs.	Rs.
1 member S. A. S. on Rs. 110		1,320	
1 Clerk on Rs. 30		360	
2 mates on Rs. 12 each		288	
Contingencies		100	2,068
			<hr/>
			8,063
Advance for purchase of seed			<hr/> 10,000 <hr/>

I am proposing a steady increase in the number of central seed stores. The rate of increase is on the average five per annum. The central seed store, with smaller subsidiary seed stores connected with it, is a convenient unit for control of expenditure and audit purposes. This is an important administrative matter where a large volume of grain is handled in small lots. Another point in favour of central seed stores is that the danger of damage during the monsoon is reduced to a minimum.

The advances for seed distribution are chiefly met from an advance provided by the Government of India. The total amount of advances now used is Rs. 2.86 lakhs of which Rs. 1.71 lakhs is provided by the Government of India and Rs. 1.15 lakhs by the Local Government from the Famine Insurance Fund.

There has been considerable discussion regarding the method of financing seed distribution. The Government of India have been unable to provide further advances. The provision of funds by the Local Government from the famine relief fund has been questioned. Under the present arrangement the advances do not pass through the provincial budget, and are, therefore, removed from the purview of the Provincial Legislative Council. This is scarcely correct for a transferred department.

A proposal has been considered for making the advances required for the purchase of seed a budget item. This means that it would be voted annually by the Council and all cash receipts would be credited into the treasury. The scheme could be worked, but it would be cumbersome and likely at first at any rate to restrict distribution on grain *sawai*. The present method of advances is perfectly satisfactory, and I consider that the Government of India should continue to provide the Local Government with the advances required for seed distribution as a part of its contribution to agricultural development.

QUESTION 12.—CULTIVATION.—A large increase in the outturn of sugarcane can be obtained by the adoption of the Java method of cultivation. This has been fully worked out for Indian conditions at the Shahjahanpur farm. I do not propose to give the technical details of the cultivation here. The Commission will see the method in operation at the farm. This method can be used on well drained moderately light soil wherever irrigation is available and with improved varieties of cane results in 2½ to 3 times the normal yield of sugar. I give below the recorded cost of cultivation of a field of 3.28 acres which the Commission will see at the Shahjahanpur farm.

Area 3.28 acres.

	Rs.	A.	P.
Ploughing	125	8	6
Manure	279	0	4
Seed	155	1	1
Irrigation	178	5	2
Trench making	52	13	11
After cultivation	91	11	4
Earthing up	16	4	0

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	Rs. A. P.
Watching	30 0 0
Irrigation necessary for keeping seed	29 11 6
Share of repairs to dead stock	16 8 0
Total ...	974 15 10

Per acre=Rs. 297.

The costs at the experiment station represent a maximum figure and will be reduced considerably on cultivator's and zamindar's fields under canal irrigation.

For example, two heavy items are: seed (Rs. 155) which is charged for at the rate of of Re. 1 per maund; irrigation (Rs. 178) which is very expensive owing to the use of an oil engine using kerosine instead of crude oil.

On cultivator's fields these two items will be replaced by seed at cost price, i.e., 4 annas a maund and canal irrigation at Re. 8 per acre for the whole season. The total cost on a field of 3.28 acres being Rs. 39 and Rs. 26, respectively. It is estimated that cultivators and zamindars can grow a crop of 800 maunds per acre of improved varieties of sugarcane by this method at a cost of 4½ annas a maund.

This method has widely been adopted in the tube well irrigated areas of the Hardoi district which the Commission will see. It has been successful wherever it has been introduced. A wide extension of demonstration is proposed in the Sarda Canal areas as soon as the system starts work.

QUESTION 14.—IMPLEMENTS.—It is a mistake to assume that the existing implements used by the cultivator are no good. They are the result of generations of experience and are suitable for a great deal of the work they are called on to do. The indigenous implements now in use in these Provinces can never be entirely superseded under the prevailing conditions of soil and climate.

The position is that the latter require supplementing by improved ploughs, harrows and the like if a higher standard of cultivation is to be introduced. Suitable implements have been selected by the Agricultural Department. The introduction of these has been fairly satisfactory up to date. A total of 9,062 improved implements were distributed by the Agricultural Department in 1926. The cultivator wants convincing of the usefulness of new implements before he will invest money in them. This is a regular part of our demonstration system.

All demonstration centres, seed stores and other agricultural institutions carry a stock of selected implements which are purchased either on cash payment or by means of *taccavi* loans which are granted by district authorities for the purpose. The existing *taccavi* rules are suitable and advances are freely used by the cultivators.

I consider that the issue and recovery of *taccavi* advances is best done by the revenue authorities acting on the advice of the local agricultural officer. The cultivators are accustomed to deal with the district officials in all matters relating to *taccavi*. The only complaint is the delay which occurs in issuing the advance.

It is obvious that the introduction of improved implements for 35 million acres of cultivated land cannot be carried out by a Government Department. Private enterprise is necessary. Many Indian firms are specialising in the manufacture of implements of approved design. They are producing a good article at a fairly reasonable price. Progress is being made slowly and would be much faster if the firms were in closer touch with the markets.

The tendency is for firms dealing in all kinds of agricultured goods, manures as well as implements to rely solely on the Agricultural Department as their sales agents. Insufficient effort is made to explore the possibilities of the markets themselves. Nothing is done beyond the common forms of advertising, i.e., printed pamphlets and sheets in the vernacular. This, of course, is of very limited application in a country where the majority of the cultivators cannot read.

All the help the department can give to private firms is given. They are allowed to store a certain number of implements at our seed stores and so forth. They are put into communication with intending purchasers.

With regard to agricultural machinery as distinguished from tillage implements, the greatest need is to replace the slow and tedious but not necessarily inefficient methods of handling crops by the use of power-driven machinery. Small power-driven sugarcane mills and threshing machinery would effect an enormous saving of bullock power. Both are capable of being run on co-operative principles.

QUESTION 15.—VETERINARY.—I consider the Veterinary Department should continue to be controlled by the Veterinary Adviser. It is a professional service and the problems can only be appreciated and dealt with effectively by a professional head. Such observations as I have been able to make in the course of my duties as Director of Agriculture lead me to the conclusion that the effectiveness of the Veterinary Department would be immeasurably increased by the transfer of the control of the subordinate veterinary staff from the District Boards to the Head of the Veterinary Department. This means that a Subordinate Veterinary Service will have to be organised on similar lines to that of the Subordinate Agricultural Service. I am strengthened in this view by the results of attempts to co-operate with the agricultural committees of the District Boards with regard to the general agricultural propaganda and education.

QUESTION 16.—ANIMAL HUSBANDRY.—The present position of cattle breeding is explained in detail in Chapter VIII of the Report on Agriculture in the United Provinces.* The technical problems will be dealt with in the evidence of the Deputy Director in Charge of Cattle Breeding Operations, who will also be one of the witnesses examined. I shall, therefore, confine my remarks to the administrative side and to placing before the Commission my views regarding the expansion immediately desirable.

The two cattle farms in the Kheri and Muttra districts were transferred to the Agricultural Department from the Civil Veterinary Department in 1922. They were placed under the control of a special officer, and the organisation of the cattle breeding section of the department was commenced.

The technical staff at present consists of:—

One Deputy Director (Rs.500—50—1,500).

One United Provinces Agricultural Service Officer (Rs.250—25—750).

Seven Members of the Subordinate Agricultural Service (Rs.110—5—270).

Two Farm Overseers (Rs.90—5—200).

The budget grant for 1926-27 was Rs.2.13 lakhs.

Government is advised on all matters of policy by a Provincial Cattle Committee established in 1922. The composition of the Committee is as follows.—

- (1) Director of Agriculture (Chairman).
- (2) Veterinary Adviser to Government.
- (3) A member nominated by the British Indian Association.
- (4) A member nominated by the Agra Zamindars Association.
- (5) A member nominated by the United Provinces Zamindars Association.

*Not printed.

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- (6) } Two members elected by the United Provinces Legislative
 (7) } Council.
 (8) }
 (9) } Three members nominated by the United Provinces Government.
 (10) }
 (11) } Deputy Director in charge Cattle Breeding Operations
 (Secretary).

This committee is one of the most useful and regularly attended of our expert committees. All matters relating to cattle in the United Provinces are referred to it for opinion by Government. The policy of the cattle-breeding section with regard to technical work, propaganda, the method of issuing bulls and the like is discussed, and all items of new expenditure are considered before demands for grants are submitted to the Council.

As a result, we are able to work on a definite policy which has public approval. I consider the development of cattle breeding under a special officer as one of the successful efforts of the Agricultural Department. I do not anticipate any difficulty in obtaining the grants required for new expenditure.

The number of bulls issued from the two cattle-breeding farms is given below:—

1922-23	...	...	...	...	...	...	...	...	46
1923-24	...	...	...	...	...	...	...	...	72
1924-25	...	...	...	...	...	...	...	...	79
1925-26	...	...	...	...	...	...	...	...	100

In June, 1926, 374 departmental bulls were at stud in various parts of the province.

Up to a recent date bulls were distributed almost entirely on loan mainly, though not exclusively, through district boards. They remained the property of Government, and were ordinarily returned to the farms at the end of five years. The Boards selected suitable persons to keep the bulls, and paid the way expenses to and from the farms in addition to two-thirds of the cost of maintenance, one-third being provided by the person who kept the bull. This scheme was necessary in the early stages to popularize the use of improved breeding stock, but it is now being replaced by the direct sale of bulls from the farms at the following rates:—

		Two years old.	Three years old.	Four years old.
		Rs.	Rs.	Rs.
Montgomery Kosi Hissar	...	80	150	200
Kherigarh Parchar	...	60	100	120
Murrah buffaloes	...	150	200	250-275

In order to develop the controlled breeding areas to which reference is made below, the Cattle Committee have approved of a scheme by which breeders in these areas can obtain a bull at one-third the above cost plus way charges from the farm.

In addition to the above, bulls are distributed on special terms to persons desirous of dedicating them for religious purposes, but the demand under this head is not great.

The new expenditure 1926-27 on the cattle-breeding section is given below:—

(1) Extension Madhurikund farm.

					Rs.	Rs.
Non-recurring	...	...	...	...	90,145	
Recurring	...	...	...	...	9,622	99,767

(2) Model dairy Madhurikund farm.

Non-recurring	...	...	...	...	18,063	
Recurring	...	...	...	...	4,276	22,339

	Rs.
(3) Purchase of 145 bulls for distribution	10,000
(4) Construction of Silo Towers	5,000
	Total 1,37,106

This will increase the number of bulls available for issue, but the supply will still be inadequate for the needs of the Province. We are still relying too much on purchasing surplus stock from the Punjab farms.

Our object is to establish a cattle-breeding farm in each of the main cattle-breeding tracts. One is immediately required in Bundelkhand. The estimated cost is:—

Non-recurring, Rs.2.13 lakhs.

Recurring, Rs.0.23 lakhs.

Proposals will be placed before the Council in March, 1927, for the expenditure required in 1927-28.

An increase in the technical staff is required. The immediate requirements I put as follows:—

(1) A second Deputy Director on Rs.500—50—1,500.

(2) Two United Provinces Agricultural Service Officers with special training in Animal Husbandry on Rs.250—25—750.

(3) Ten members of the Subordinate Agricultural Service on starting pay of Rs.110.

The establishment of controlled breeding areas is a most promising line of work, and we propose to increase the number as soon as the staff is available. There are at the present time three controlled areas in Muttra and Etawah districts. The organisation of two is well advanced. A detailed description is given in Chapter III, page 16, of the Annual Administration Report of 1925. It is important to note that controlled breeding areas will enable a record of breeding operations to be maintained, which is not possible when the distribution of bulls is scattered over a wide area of the Province.

A point which requires investigation and is receiving attention at the cattle-breeding farms is the intensive cultivation of fodder crops. This appears to be only means of permanently improving the efficiency of the cattle of many tracts. I do not think that a Fodder Specialist is required. The improvement of fodder crops can be taken up in connection with the general question of *kharif* crops by the section of crop improvement which I have proposed in a previous answer. The cultivation problems can be investigated at the cattle farms.

The improvement of cattle is one which the agricultural sub-committee of District Boards have been able to undertake with some measure of success. Grants are regularly made by the United Provinces Board of Agriculture towards schemes initiated by District Boards. These usually take the form of purchasing and maintaining a certain number of stud bulls for use with selected herds.

In 1926 grants approximately of Rs.1,200 each were made to nine District Boards. It is proposed to continue grants in cases where satisfactory reports are received.

QUESTION 17 (d).—AGRICULTURAL INDUSTRIES.—Government should fully explore the possibilities of establishing in the United Provinces the manufacture of sugar by modern methods.

The agricultural work relating to the production of large yields of good quality cane has been done. It is quite possible that the large centrals of Cuba and Java will not be suitable in India. For one thing the transport of the cane for long distances adds to the cost of production. I do not know if any large central in India works up to its full capacity over a series of years. I think a promising line of development likely to decrease

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difficulties connected with a full supply of cane is the establishment of a chain of small factories under unified technical control, but until one such unit is in actual operation it is not possible to give a definite opinion.

I recommend the installation of one unit crushing 60 tons of cane a day for experimental purposes. There are many areas in Hardoi and on the new Sarda Canal areas where the conditions are suitable.

The overhead charges of working a single experimental unit would be high, but no loss is estimated on it.

I give below an approximate balance sheet:—

<i>Capital.</i>		<i>Rs.</i>
Cost of machinery ... ..	...	2,00,000
Working capital ... ..	...	1,00,000
		<hr/>
		Rs.3,00,000

60 tons of cane per day for a season of 80 days = 129,600 maunds of cane, say, 130,000 maunds of cane. This will require 250 acres of improved cane and about twice that area of indigenous cane. The outturn of sugar will be 8 per cent. from improved canes and the outturn of molasses 3 per cent.

<i>Receipts.</i>		<i>Rs.</i>
10,400 maunds sugar at Rs.12 per maund ... ..	...	1,24,800
3,900 maunds molasses at Rs.3 per maund ... ..	...	11,700
		<hr/>
		Rs.1,36,500

<i>Expenditure.</i>		<i>Rs.</i>
Manufacturing cost of 10,400 maunds of sugar at Rs.4-8 per maund ... ..	...	46,800
Cost of 130,000 maunds of cane at 7 annas ... ..	...	56,875
Depreciation ... ..	...	20,000
		<hr/>
		Rs.1,23,675

Manufacturing charges have been put at a very high figure. They will be much reduced in a chain of small factories under unified technical control.

The experimental unit would therefore be expected to give a profit of Rs.12,825 per annum or just over 4 per cent.

QUESTION 20.—MARKETING.—I propose to discuss three commodities, wheat, raw sugar and cotton. The value of these crops in the United Provinces is 44.14, 41.16 and 3.04 crores of rupees respectively.

Local practices vary, but the differences are in detail and not in principle. Examples illustrated by the three crops at any place give a picture of marketing operations in the Province.

I have stated in a previous answer that we have not sufficient statistical information regarding the charges incurred at the different stages of distribution to make a complete examination. It is only possible to make broad generalisations and to indicate the points where further inquiry is likely to prove fruitful. Accurate information can no doubt be obtained, but it is difficult to get. The collection will take time and require the services of a special officer. Merchants and others connected with trade in produce are extraordinarily reluctant to give information about the details of their business transactions.

Wheat.—A system of weekly and bi-weekly markets in large villages and small towns exists throughout the Province. The cultivators bring their grain to them and sell to merchants (*baniyas* and *banjaras*) who operate on a small scale. The rate in these markets is lower than the rates in the larger

grain *mandis* which are in touch with the export trade. I do not know what the difference is in various parts of the Province, but in the country markets of Rohilkhand with which I am familiar a difference of one seer per rupee may be taken as within the limits of possibilities. This means that, if wheat is selling in the large distributing markets at 8 seers per rupee or 80 annas a maund, the producer who brings his grain to the village markets gets 9 seers per rupee or 71 annas per maund, a difference of 9 annas. The small market is the point where the producer first comes into contact with the buyer. The competition amongst buyers is not keen. There are generally few. It is here that the cultivator is most likely to be hampered in his efforts to obtain full value for his produce, partly by the lack of information, partly by financial embarrassments and partly owing to his isolation. News travels with rapidity in India. The price of grain is a universal topic of conversations amongst wayfarers of every class. It is unlikely that villages even in remote places are without some knowledge of the movement of prices. However this may be, the small collecting market in the hands of one or two small buyers to whom the sellers are usually under financial obligations is the stage of marketing which needs immediate investigation. It is necessary to know, for instance, for all parts of the Province the rates prevailing in the villages and small collecting markets in order to compare them with the prices prevailing in the large exporting centres. This in itself is an investigation of some magnitude.

Many cultivators bring their own produce directly to the larger markets in order to get the higher prices prevailing there. We thus get the whole crop in small consignments transported in country carts coming into the export markets where the price is regulated by world prices, when there is surplus for export, where there is competition amongst buyers and information regarding price movements.

When scarcity is anticipated by unfavourable monsoon reports, when stocks are low, there is certain amount of gambling. The result is a rise of prices above the world prices. The situation in recent years has been adjusted by imports from Australia. In 1921 the most disturbed year in recent history with a short crop in India and world markets unsettled and jumpy the normal relation between Indian prices and world prices was adjusted by imports before the new crop was harvested.

The producer stands to gain by a rise in prices due to incidents of this kind. Severe or prolonged famine, of course, would create exceptional circumstances requiring measures for the regulation of prices.

The question of marketing is so far as it relates to the producer obtaining a fair price for his grain is best considered in a season when there is a surplus for export.

The carts bringing the consignments of grain into the central grain market are met some miles away by the *arhatia's* servants whose business it is to persuade the cartmen to take the grain to a particular *arhat*. These gentlemen live on what would be called "tips." Any one who has listened to a dialogue on the road side between one of them and a cultivator bringing in a cart load of grain will be satisfied that the cultivators are quite able to hold their own. On arrival at the bazar the cart goes to the *arhatia* or commission agent, who disposes of the grain, selling it to the large exporting merchants. The *arhatia's* commission in the Hardoi district is stated to be one per cent., but I think further investigation will show this figure needs revision.

It is difficult to distinguish at sight between cases in which the *arhatia* acts as a commission agent and as a purchaser using his own money. Most *arhatias* act in both capacities. It is universal for grain to pass through the hands of the *arhatia* before it reaches the exporting merchant. During its passage through the bazar to the exporting merchant a number of charges are incurred. Figures which have been collected for the Hardoi

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district are given below. These figures are, I am inclined to think, pitched too high and can only be taken to indicate the amounts in a general manner. Taking as a basis 100 maunds of wheat Rs.5 per maund, the following charges were incurred in the bazar at Hardoi in the season 1926.

	Rs.	A.	P.
Weighing charges	8	6	7
Market dues	0	5	0
Charity	0	1	3
Menial servants	0	1	3
Cleaning charges	6	4	0
Arhatia's commission	5	0	0
	20	2	1

This works out to 3.22 annas per maund. In addition to this the transport charges taking an average of 15 miles from the local markets comes to 1.5 annas per maund.

The total charges on one maund of wheat from the village to the merchant who puts it on rail for export comes to just under 5 annas a maund when wheat is selling at Rs.5 per maund.

To determine the price which will be offered in the larger up-country markets it is necessary to ascertain also the charges which have to be added to the cost of wheat before it is placed on the final market. These fall into three parts.

(1) The first refers to the charges incidental to placing wheat f.o.r. at the port of shipment after purchase in the up-country export markets.

(2) The second refers to the charges from f.o.r. to f.o.b.

(3) The third refers to the charges subsequent to shipment (freight, insurance, &c.). These, together with the cost of handling in the up-country markets, give a measure of the total charge from the point of purchase to the point of distribution. Published information on these points does not exist. As far as I am able to see, difficulty will be experienced in getting it. No export firm could be expected to disclose to its competitors its method of working and its computation of working charges. An examination of the prices of hard foreign wheat in England and the wholesale prices in India, considered in conjunction with export, enables one to arrive at rough approximation.

A comparison shows that the difference between the prices of hard foreign wheat in London and the wholesale price in India is round about 30 annas per maund of 82 2/7 lbs. when export is brisk.

An analysis of this difference will show where the main charges are incurred. A high degree of accuracy is not claimed for the statements now put forward. The most that can be said is that they furnish a basis for discussion. The charges subsequent to shipping are somewhat difficult to assess, but with the freight at present ruling a round figure of 10 annas will not be found to be far out. This leaves 20 annas to be divided between:—

(1) The charges incidental to placing wheat f.o.r. at the port of shipment, and

(2) The margin for charges between f.o.r. to f.o.b.

Roughly speaking, it may be said that it takes about 11½ annas to place f.o.r. at the ports a maund of wheat purchased in the United Provinces. Of this 11½ annas, 10 annas represent freight. The remaining 8½ annas constitute the charges f.o.r. to f.o.b. or perhaps more accurately the margin within which the exporters have to work at the ports.

The approximate amounts of the intermediate charges between the point of purchase and the point of shipment can be tabulated as follows:—

Annas per maund.
(*Maund, 82 2/7 lbs.*)

Transport from smaller collecting markets to larger markets	1.5
Handling commission and other charges incurred in up-country markets	3.2
Charges incidental to placing f.o.r. at port ...	11.5
Margin for charges incurred f.o.r to f.o.b. ...	8.5

From what has been said above it is clear that the cultivator could be greatly benefited by better organisation of the small collecting markets and agencies. He receives, it is estimated, a rate 1 seer per rupee less than the rates in the larger grain markets. The expenditure incidental to placing wheat on the latter market is small, the main item being transport, which does not exceed 2 annas per maund.

It is not at all easy to suggest just what can be done by Government at once. In my opinion, matters will not materially alter until the economic condition of the cultivator is changed; in short, until education and a higher standard of agriculture have made him a better business man, but this is a far distant ideal.

Government purchase and regulated markets I rule out at once as impracticable propositions. Societies for the co-operative sale of agricultural produce are difficult to manage. The Oakden Committee, whose report is before the Commission, considered this question in 1926, and did not recommend them until the Co-operative Department had put rural credit on a sounder basis. In view of the opinion expressed by an expert committee, I hesitate to recommend such societies in this Province.

Much can probably be done by a wider distribution to smaller markets of information regarding market conditions. A service of weekly telegrams from district headquarters to smaller markets within reach of a telegraph office would ensure prices prevailing in up-country export markets becoming more widely known throughout the countryside. Telegrams could be sent to the village schoolmaster, for posting in the markets by him.

Other measures that suggest themselves to me are the following:—
(1) the possibilities of the extended use of motor traction for transport to the railway. A service of motor lorries connecting the smaller and larger markets might lower the cost of transport and relieve bullocks for cultivation work. (2) The expenses incurred at all stages of marketing for cleaning, as well as the heavy deductions for quality now necessary, would be lessened by the use of modern threshing machines, preferably run on co-operative lines.

(3) Loss during storage would be avoided by the provision at collecting markets of small *pucca* godowns on the lines of the central seed depôts of the agricultural holding from 10,000 to 20,000 maunds of grain. This would be expensive. Such godowns would cost approximately Rs.12,000 each. They would have to be built by Government and leased to small merchants. This would add, of course, to the handling charges in the collecting markets.

I give a brief summary of the conclusions I have arrived at based on the figures given above for the charges incurred from the point of collection to the point of final distribution in years of export.

(1) With the small merchant in the collecting market, the *bania* and *banjara*, I have already dealt. His services or similar services are essential in the early handling of a scattered crop, but there is no reason why he should exploit the cultivator to the extent he does. The only remedy is to get the cultivator out of his hands both with respect to borrowing and to advances for seed. The former can only be achieved by a complete remodelling of the system of rural credit on co-operative lines. The second

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is not so difficult, and it is possible that the extension of the seed distribution schemes initiated by the Agricultural Department may achieve this in a reasonable period of time.

(2) The charges (roughly estimated at 3-2 annas per maund) incurred in handling in the larger grain markets preparatory to distribution or putting on rail for export are not excessive. The *arhatia* and the Indian export merchant renders useful service for what appears to me to be a reasonable remuneration. The larger grain markets are well supplied with information regarding price movements. Many of the leading merchants subscribe to Reuter's daily telegrams. There is competition amongst buyers.

(3) The main charge incidental to placing grain f.o.r. at the port of shipment is, of course, railway freight. A reduction in this would be helpful. I have not complete statistics of the movement of railway freights, but doubtless these will be placed before the Commission. The shortage of wagons is a chronic complaint in India, but with this I am unable to deal.

(4) The margin left for the exporting merchants to work within from f.o.r. to f.o.b. at the ports (estimated by me at 8½ annas per maund) is high.

This points at once to need for the provision of improved facilities for handling the wheat crop at the ports. I am not, however, in a position to offer detailed suggestions regarding this.

Raw Sugar.—Raw sugar known, as *gur* and *rab*, is not exported. Price was formerly regulated solely by the condition of the provincial cane crop. In recent years the prejudice against the use of factory-made sugar has disappeared, and the price of *rab*, from which white sugar is made, has been controlled by the Calcutta price of Java sugar. The price of high-class *gur*, a form of sugar only obtainable in India, is still more or less dependent on local production and quality.

I propose first to deal with the marketing of sugarcane in Rohilkhand, where the entire crop is turned into white sugar and molasses by an indigenous process of manufacture. The manufacturer is frequently the village zamindar or the village zamindar in partnership with the sugar broker, locally known as a *khandsari*. The small factory is set up a short distance from the sugarcane fields and the produce is delivered as it is harvested. The system of sale is peculiar to Rohilkhand. Juice is sold by weight; the unit employed is 100 *kutcha* maunds, known as a *cikra* or *karda*. This varies in different places. For the purpose of this discussion it may be taken as 66.52 maunds of 82 2/7 lbs. The method of arriving at the quantity of juice sold is tortuous, but beyond bewildering the young agricultural officer trying to get information, no harm is done. It does not lead to incorrect payments. The whole village community is present to watch the process, and each cultivator knows how much juice he has delivered and been credited with. I give below a translation of a registered contract for the sale of juice between a cultivator and the owners of a small sugar factory (*bel*). The contract is old, but it is the standard form of contract still in use.

"I, Rasul Khan son of Inayat Ullah Khan caste Pathan am a resident of Burhanpur Tehsil Tilhar district Shahjahanpur.

"Whereas I have borrowed Rs.99, half of which is Rs.49.8, from Abdul Qadir Khan son of Ali Ahmad Khan of Shahjahanpur Mohalla Mahmand Hadaf and Qudrat Ullah Khan son of Mindoo Khan of Mohalla Tarin Rangi Choupal out of the Mohallas of Shahjahanpur as an advance (*peshgi*) on sugarcane and have brought into my own use. It is agreed that in lieu of the said sum 300 maunds of juice *katcha* weight without mixing any water, produce of the year 1314 Faslî will be delivered at the rate of Rs.28 per hundred maunds *katcha* weight from the month of *Pus* to the end of *Phagun* of the said year, at the *bel* of village Burhanpur after pressing the same during the day time and filling the *mata* to the brim

and with free bagasse to the owners of the *bel*. If, however, there are rains or the *bel* is out of order, the juice will not be pressed. If however I prepare *gur*, *rab* or sell seed or the juice may be supplied to the said owners in less quantity or not at all, then I shall pay to the said owners damages at the rate of annas two per *katcha* maund. Whatever amount remains due from me will be paid without interest on *chait badi panchami* of the said year.

"If however the money is not paid then I shall pay the sum with interest at the rate of Rs. 2 per mensem from the date of the execution of the bond to the owners of the *bel*. It is further agreed that three big *dolchis* of juice will be given to the said owners as *bel* expenses.

"Therefore this bond has been executed as an authority (agreement)."

The contract shows that the producer deals directly with the manufacturer. The services of intermediaries are dispensed with. The system is not open to objection in theory. In practice, however, the cultivator's need of money at a particular time of year is usually fully exploited. Sugarcane is the cultivator's most valuable crop and he invariably borrows money on it. The manufacturers as a rule advance money in July, August and early September. The condition of the crop is determined by the monsoon and is definitely known by then. Occasionally money is advanced at the time of sowing. When the advance is given a contract is made for supplying juice in the following season (December to March). The cultivator is compelled in order to obtain the advance to accept a lower price for forward sales in August than the estimated price at harvest. In normal seasons the cultivator gets on the average Rs.10 per *cikra* less by forward sales than he would get if he sold his crop at harvest time. Taking Rs.60 per *cikra* as an average price for juice at harvest time the cultivator who takes an advance on his crop in July and August gets in an average season Rs.50 per *cikra*.

The exact meaning of these figures is given below. The average yield of cane is 350 maunds per acre and 55 parts of juice is obtained from 100 parts of cane. The cultivator or zamindar selling juice forward in August and September obtained 6.61 annas per maund for his cane. If he had sold it at harvest rate, he would have obtained 7.94 annas per maund. In other words, he obtained Rs.144.7 per acre instead of Rs.173.4 per acre. I think that there can be no doubt that the financing of the sugarcane crop by means of advances combined with forward sales to zamindars and *khandsaris* results in the cultivator obtaining less than the market value of his most highly priced crop.

There is probably no better instance in the Province of the need for an organised system of co-operative credit. The organisation in Rohilkhand will be a difficult and uphill task. The amount required to finance the sugarcane crop in this tract is a large sum. The area is Rs.3.19 lakhs acres and the value is estimated at Rs.679.5 lakhs. In addition the interests of a powerful body of capitalists are involved.

(1) The abolition of the present system of advances combined with forward sales of juice in August and September, (2) advances to finance the sugarcane crop on reasonable terms, (3) the sale of sugarcane by weight on a basis of sugar content at harvest and, (4) the introduction of power crushing and modern methods of handling the crop are the only methods by which the cultivator can be assured of getting full value for his crop.

The whole industry in Rohilkhand needs reorganisation. The Indian Sugar Committee of which I was a Member examined this problem in detail. A pioneer central factory financed and managed by Government was recommended. The capital required was estimated at Rs.59 lakhs and the amount of cane required was 27.2 lakhs of maunds.

Later examination of the practical difficulties of managing and financing concerns of this magnitude has led me to the conclusion that it would be better to aim at installing a chain of small central factories crushing 60 tons of cane a day. There are many places in the Sarda Canal areas where conditions appear to offer every prospect of success.

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Gur.—*Gur* except the amount required for consumption in the villages passes through the large markets. It cannot be handled during the rains. It is a perishable commodity and large quantities cannot be carried over from one season to the next without loss. Prices are therefore subject to marked seasonal variations. It is the cheapest in April and May, the price gradually rising as the season advances. The process of marketing is the same as for wheat. *Gur* is collected in small markets or in villages by *banias* who pay a rate about a seer lower than the rates in the big markets.

The charges for handling in the large market and placing f. o. r. are slightly higher than in the case of wheat owing to the careful handling required.

The total charges on 100 maunds of *gur* are given below:—

	Rs. A. P.
(a) <i>Taula</i> charges for weighing in the village from <i>bania</i> who purchases <i>gur</i> at 0-0-3 per rupee from the buyer ...	7 13 0
(b) <i>Tahbazaria</i> at 0-1-0 per cart from seller ...	0 5 0
(c) Weighing charges at $\frac{1}{4}$ seer per maund from the seller ...	3 2 0
(d) Charity $\frac{1}{4}$ seer per maund from the seller ...	1 9 0
(e) To sweeper, <i>kahar</i> and <i>rotkara</i> at $\frac{1}{4}$ seer per maund from the seller ...	3 2 0
(f) <i>Karda</i> allowance at $\frac{1}{4}$ seer per maund from the seller ...	6 4 0
(g) Commission charges 0-0-3 per rupee from the seller ...	7 13 0
(h) Packing charges at Rs.2-0-0 per hundred maund ...	2 0 0
(i) Cartage to station from the merchant at Rs.2 per hundred maunds ...	2 0 0
(j) Railway miscellaneous charges at 4 annas per ton ...	0 14 0
Total	34 14 0

Cotton.—The charges in handling raw cotton from the producer to the ginner are illustrated below by figures collected in the Cawnpore district by the Deputy Director. Let us suppose that the produce of some four cultivators, 100 maunds of raw cotton, is purchased by the village *bania* for Rs.8 per maund. He is almost certain to have made an advance to the cultivators probably up to half the value of the crop say Rs.400. He takes the raw cotton into one of the larger markets and sells it to a cotton dealer for Rs.9 per maund. The *bania* thus makes a profit of Rs.100 on a 100 maunds of raw cotton which cost him Rs.800. Against this he has to pay out

	Rs. A. P.
Interest on Rs.400 advanced to cultivators for 2 $\frac{1}{2}$ months at Re. 1 per cent. per month ...	10 0 0
Cartage from the village to the market at Rs.0-2-0 per maund ...	12 8 0
Handling charges ...	2 0 0
Watching ...	1 0 0
Total	25 8 0

The profit on the transaction after allowing for legitimate interest on the advance to cultivators is Rs.74-8 on a capital outlay of Rs.800.

The cotton dealer takes the 100 maunds of cotton to the nearest recognised cotton market. He employs the *arkatia* or commission agent who arranges a sale at current market rates to a cotton ginner, to a wholesale dealer or exporting firm. We can assume for the purposes of this discussion that it

is sold to the ginner at Rs.10 per maund. The small dealer will incur the following charges.

	Rs. A. P.
Interest on Rs.1000 at Re. 1 per cent. per mensem for 14 days before it is sold	4 8 0
Brokerage on Rs.1000 at Rs.0-4-0 per cent.	2 8 0
Godown charges	2 0 0
Labour for loading	1 4 0
Cartage (6 carts for 16 miles)	30 0 0
Watching	2 0 0
Karda allowance to buyer at 2½ seers per cart	3 12 0
	46 0 0

The small dealer makes a profit of Rs.54 on 100 maunds of cotton on a capital outlay of Rs.900.

The ginner or export merchant who purchases the raw cotton through his *arhatia* or commission agent incurs the following charges:—

	Rs. A. P.
Interest on 1000 at 6 per cent. for 1 month	5 0 0
Pay to the <i>arhatia</i> as weighment charges at Rs.2-5-6 per Rs.100	23 7 0
<i>Chabena</i> (allowance to weighmen) at 8 annas per cart	3 0 0
<i>Palledari</i> (carrying charges) 3 pies per maund	1 9 0
Charity at 6 pies per Rs.100	0 5 0
Watching and insurance	3 0 0
	36 5 0

100 maunds of raw cotton costs the ginner Rs.1036-5-0 delivered at the ginnery. Rs.236-5-0 has in the form of various middlemen's charges been added to the initial price of Rs.800 paid to the cultivator. The figures given above will of course vary from time to time with the price of raw cotton but they furnish the best record available of the charges involved in handling the cotton crop.

On 100 maunds of raw cotton the itemised charges are as follows:—

	Rs. A. P.
Handling charges	4 13 0
Brokerage	2 8 0
Market allowance	6 12 0
Interest	19 8 0
Weighing charges	23 7 0
Charity	0 5 0
Insurance	1 0 0
Cartage	42 8 0
Godown charges	2 0 0
Watching charges	5 0 0
	107 13 0

The services rendered by the various intermediaries are given below:—

(1) The *bania* finances the cultivator by advances and as a result it is estimated that he gives the cultivator approximately Rs.2 per maund of *kapas* less than the rates prevailing in the established cotton markets.

(2) The small dealer collects supplies from the small village *banias* and transports them to the established cotton markets.

(3) The *arhatia* acts as a commission agent between the dealer and the ginner.

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The establishment in the United Provinces of special cotton markets on the Berar system has been fully investigated at the suggestion of the Indian Cotton Committee (*vide* page 205 of their report.) The Indian Cotton Committee arrived at the tentative conclusion that the area was too scattered at present to justify the establishment of separate markets. It was found on further enquiry that legislation would be necessary in the United Provinces. This Government consulted its expert committees. Their opinion was not favourable to the establishment of markets on the model of the Berar Cotton Markets and they did not consider that legislation on the lines of the Berar Cotton and Grain Markets Law was desirable. Government accepted this advice as indeed it was bound to do. The expert committees contained a large number of Members of the Legislative Council and any Act introduced in the face of such general opposition would have been thrown out.

The Industries Department attempted to establish an experimental market in Hathras but failed as it was found impossible to enforce the rules without legislation. I am inclined to take the view that the advice given to Government by the expert committees was sound in view of the special conditions in the United Provinces. Our cotton area is small and our season is very short, consequently there are no regular cotton markets in existence. In Berar and Bombay big markets have been in existence for a number of years and are easy to regulate. In Cawnpore and to a certain extent in Aligarh, cotton is bought and sold at special places in the market but this is a very different thing from the big separate markets of Berar.

My opinion is that regulations necessary to control the cotton markets can only be satisfactorily worked when a huge crop is dealt with which comes steadily into the market throughout the season. Our crop as I have stated is not a large crop, the seasons are short. There are a number of relatively small markets. If we tried to draw four walls round a limited number of shops dealing in cotton and called the inner space a market and imposed a number of somewhat onerous restrictions, the trade would simply go elsewhere.

The question of obtaining full value for a superior variety of cotton during the early stages of its introduction is still unsolved and is one of our greatest difficulties. As far as I can see, there is no alternative at present to Government purchase in the early stages although I regard this as very unsatisfactory.

QUESTION 22.—CO-OPERATION.—My considered opinion is that the Co-operative Department in these Provinces can best help agriculture by putting rural credit societies on a sounder basis. Until this is done, little progress can be expected as regards other forms of co-operation. The examination of many phases of agricultural development shows that progress is held back at every turn by the ignorance and indebtedness of the cultivator. In the sale of his produce, particularly his sugarcane crop in Rohilkhand, he is handicapped by debt.

The co-operative organisation of agriculture presents great possibilities. All who have examined the question in India admit that, but first of all rural credit societies must be increased and public confidence in them restored.

At the present time there is no demand in these Provinces for agricultural non-credit societies. The Co-operative and Agricultural Departments have tried to establish societies for seed distribution and for the management of tube wells. Year after year they are reported to be doing little or nothing. The demand for such societies has yet to be created. After years of failure a sudden outburst of successful activity is not to be looked for, and for some time the Agricultural Department will be unable to rely on co-operation to replace any of its activities.

I appreciate the fact that a start must be made. There are a number of improvements successfully initiated by the Agricultural Department which are suitable for working on co-operative lines. It is just as easy for the

department to assist properly organised societies as it is to assist individuals. I give below some of our activities which are suitable for co-operative organisation:—

- (1) Production and sale of improved seed.
- (2) Purchase and sale of agricultural implements.
- (3) Installation of small power sugarcane mills.
- (4) Threshing of rabi crops by modern machinery.
- (5) Irrigation by means of tube wells and pumping plant.
- (6) The organisation of village milk collection schemes for supplying city markets.
- (7) Well boring operations for the improvements of masonry wells.

Before societies are started, detailed schemes should be prepared by the Co-operative Department and placed before the Board of Agriculture for consideration. This is important because, I think, that our failures in the past have been in part due to insufficient consideration of the details of the schemes initiated.

QUESTION 26.—STATISTICS.—The information collected regarding area of crops in the United Provinces is accurate. The estimate of yield which is based on crop cutting experiments is fairly accurate. A very much larger number of these is required if a higher standard of accuracy is to be obtained in the five-yearly revisions of outturn. I consider that a special staff should be attached to the land records section for this purpose with a definite programme settled in consultation by the two Directors of Land Records and Agriculture. It is not fair to ask the technical officers of the Agricultural Department who are already overworked to undertake a large programme of crop cutting experiments. The work does not require a great deal of technical knowledge.

The absence of complete crop cutting tests is felt whenever the Government of India call for a return of the total outturn of another crop. For example, returns have recently been asked for the tobacco crop and the castor seed crop. Neither of these could be supplied in the absence of a series of accurate crop cutting tests.

The publication of crop forecasts is done by the Director of Agriculture. The information is collected and the draft forecasts are prepared in the Land Records Department which contains the necessary organisation. I do not consider this entirely satisfactory. I should prefer to see the whole of the forecasts carried out by a statistical officer attached to the Land Records Department who in addition to this would supervise the preparation and publication of all agricultural statistics, organise crop cutting tests and conduct such economic inquiries as may be called for.

The general position regarding agricultural statistics in the United Provinces is this. A large volume of accurate information extending over a long series of years is in existence and forms valuable material for the study of many economic problems of the Province. No arrangements exist for systematic examination. I regard the appointment of an expert statistical officer with an adequate staff (the nucleus for which exists in the statistical section of the Land Records Department) as a matter of urgent necessity. As I have already stated, it is unlikely that the Council will view sympathetically proposals for the appointment of a statistical officer. The work is largely for All-India requirements. I consider that the Government of India should undertake the financing of statistical sections for all Provinces.

A further suggestion I wish to make is that the returns of areas under improved crops introduced by the Agricultural Department should be made regularly by the patwari at the time of preparing the *jinswars*. This has already been done in four or five districts without any increase in staff and provides the Agricultural Department with valuable information.

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APPENDIX.

PARAGRAPH 175 OF THE REPORT ON AGRICULTURE IN THE UNITED PROVINCES.

The Hardoi district is a good example of co-ordinated effort between different sections of the Agricultural Department, assisted by non-official agency. The demonstration farm, managed by the department and financed by the district board, and the agricultural supply society, a purely unofficial organisation, started the development of this district; the farm has shown a good profit for many years. Conditions in Hardoi proved excellent for the construction of tube-wells, and the engineering section completed eleven wells with discharges varying from 20,000 to 30,000 gallons per hour. The next stage was the establishment of private farms by many of the leading land-owners, with the advice and assistance of officers of the department. The conclusion at this very time of a series of experiments at the Shahjahanpur research station placed in the hands of the cultivator a variety of sugarcane and a method of cultivation giving yields two to two and a half times greater than those obtained by indigenous varieties and ordinary methods, and the new variety and methods were tried with success on the Hardoi farm. Circle officers organized demonstrations on private farms and cultivator's fields, and the response was immediate. In the cold weather of 1925 intensely cultivated areas were to be seen on private farms, on land surrounding tube-wells, and on cultivator's own fields. Magnificent crops of Java sugarcane and of Pusa wheat showed the possibilities of scientific agriculture in this province, and the profits of the owners of farms were equally convincing.

Oral Evidence.

33,559. *The Chairman:* Mr. Clarke, you are Director of Agriculture in the United Provinces?—Yes.

33,560. You have provided the Royal Commission with a note of the evidence that you wish to give. Would you like at this stage to make any statement in amplification of that note?—No.

33,561. Would you kindly give us first an account of your own training and past appointments?—I was trained at University College, Nottingham; afterwards I was a lecturer at Manchester University; after that I was head of what were the County Technical Laboratories, Chelmsford, which are now the East Anglian Institute of Agriculture; and 20 years ago I joined the Agricultural Department of the United Provinces.

33,562. For how long have you been Director?—Since 1921.

33,563. Would you give us a sketch of the organisation of your department both at headquarters and in the districts, mentioning the grade of officers holding the various posts? There is first yourself as Director?—There are six circles, each presided over by a Deputy Director; each of those circles has a self-contained staff for the management of experimental and demonstration farms, seed distribution and demonstration. In addition to that, there are separate sections for agricultural engineering and cattle breeding which also have self-contained staffs.

33,564. The cattle breeding section is under another Deputy Director?—Yes.

33,565. And the agricultural engineering section?—That is under an Agricultural Engineer. In addition to that, there are the educational institutions: the Agricultural College, Cawnpore, which is a combined educational and research institution, and the Agricultural School at Bulandshahr which is wholly an educational institution.

33,566. You have no Deputy Director who is not specially attached to some particular department; all your Deputy Directors are definitely attached to particular departments?—I have no Assistant Director; in the organisation at headquarters there is myself; that is the organisation of the districts and the experimental work generally; but with regard to the organisation of administration there is myself, a per-

sonal assistant, two accounts officers, and a staff of clerks. I have no technical assistants in the administration.

33,567. Could you tell us with a little more particularity the organisation within the circle? There is the Deputy Director at the head of the circle?—Yes. Immediately under him are the United Provinces Agricultural Service officers, one or two in each circle.

33,568. Then the demonstration staff?—Under them the demonstration staff and the managers of farms and so forth.

33,569. Have the members of your demonstration staff been trained at the Agricultural College?—Yes, almost without exception; there are a few exceptions, but it is almost without exception.

33,570. Have you a record office under you?—Do you mean land records?

33,571. No, I mean an office engaged in recording experiments and experiences; for instance, if you are making an attempt to popularise the silo, what steps are taken to ensure that all the experience that you glean should be available in the future, either for yourself or for some successor?—The medium for that is the circle reports, the reports of the experimental and demonstration farms which are issued for each circle and the annual demonstration reports. The information is gathered in my office for the annual demonstration reports; that is the only record.

33,572. I am sure you will agree with me that it is very important that records of that sort should be kept, and particularly records of unsuccessful experiments?—Yes; they are kept, not in my office, but in the offices of the Deputy Directors concerned.

33,573. *Professor Gangulee*: Even the records of unsuccessful experiments?—Of course, yes, all records.

33,574. *The Chairman*: Are you recruiting yet for the new Superior Provincial Service?—No.

33,575. What are your plans?—We have none at present.

33,576. What is the policy of Government in that direction?—We are waiting for definite orders from the Government of India; we have been told to stop recruiting for the higher posts; we are not allowed to recruit for the Imperial Agricultural Service, nor are we allowed to promote our Provincial Service officers to the Imperial Service at present.

33,577. When did that instruction come in?—I cannot tell you the exact date, but it is recently, within a year or so. What I want to say is that we are not allowed to place our United Provinces Agricultural Service officers in the Indian Agricultural Service.

33,578. But what I was concerned with was the recruiting for the new Superior Provincial Service in accordance with the recommendations of the Commission over which Lord Lee presided?—It has not been constituted in this Province yet.

33,579. But it is not as regards the constitution of that service that any instructions have come from the Government of India?—I am not an authority on procedure, but I understand the limitations of pay are Rs. 1,200, and we cannot exceed that. I know the rules delegating powers to Local Governments are under re-consideration.

33,580. Then I judge from a later section of your note that you rather look forward to a day when some central educational institution should provide the post-graduate training for officers of the Superior Provincial Service?—Of the upper grade Provincial Service.

33,581. You rather feel, I gather, that that would be a more useful function for Pusa to perform than would be any service in the direction of research?—I consider that the most essential thing required at the moment is the provision of training for Deputy Directors in particular.

33,582. You say on page 13 of your note: "I advocate the development of Pusa as a purely teaching institution. In the natural course of events it seems clear that the main lines of research will have to be removed to

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provincial centres whatever course may be adopted with regard to their control whether it be provincial or central." Do you contemplate the complete divorce of teaching from research?—No, not the complete divorce.

33,583. You attach importance to teaching and research being carried on in conjunction?—Yes, but not the extensive research which is required for the whole of India. It cannot be carried on at an institution which is also a teaching institution. For instance, I do not think you could do the work which is being done at the Central Institute in conjunction with the teaching institution, nor do I think the work at Coimbatore can be done in conjunction with the teaching institution.

33,584. Then you say the research activities of Pusa are bound to decline. In that connection, I should like to ask you what is your view about the services Pusa has rendered and can render in future as a Central Research Institute?—I have stated what they have rendered; I think I have made that quite clear. I do not think that the result of the research work carried out at Pusa, except as regards the improvement of wheat, has had any effect on the agricultural development of these Provinces.

33,585. Do you not think that a central research station can usefully concern itself with problems of a fundamental nature and of general application, problems of soil chemistry, for instance?—Yes, a limited number of problems.

33,586. Is it your view that Pusa is being conducted on too ambitious a scale at this moment?—Do you mean with regard to research work?

33,587. I do?—No.

33,588. You are anxious to see that where extension takes place it should take place in the Provinces?—That is my idea.

33,589. "Research activities at Pusa are bound to decline," you say. Are you familiar with the history of the Central Department of Agriculture in the United States of America?—I suppose I am as familiar as any foreigner is.

33,590. That is a very active and powerful organisation, is it not?—Yes. I do not possess sufficient knowledge to discuss the thing from that angle.

33,591. Now to turn to the commencement of your note again. In the second paragraph you say: "I have no hesitation in saying that it is as easy to get money voted for research in these Provinces as it is in England, if the problems have a direct bearing on provincial agriculture." Does that mean that it is reasonably easy to get money voted for research in this Province?—I can perhaps answer that question best by quoting from a speech I made in the Legislative Council the day before yesterday: "The budget of the Agricultural Department for 1926-27 was 24·4 lakhs; the Budget for 1916-17 was 6·8 lakhs. In ten years our Budget has increased by three and a half times. I think this will satisfy the House that agriculture has not been neglected either by Government or by the Legislative Council since my department became dependent on the vote of the Council for its supplies." Judging from the point of view of financial provision, progress has been remarkable.

33,592. Mr. Farr, who has been good enough to provide us with a note of the evidence which he wishes to give, says: "More men and money are needed in order to expand the Agricultural Department to enable it to cope to an appreciable extent with the task before it. At present it occupies a position of secondary importance in the eyes of Government . . ." Mr. Farr appears there to be a little less optimistic than yourself?—If I can make a claim to anything I make a claim to having a very wide experience of this kind of Government which has been in existence now for six years.

33,593. It is your view, I understand, that on the whole the tendency of the Reforms has been to quicken public interest?—Undoubtedly. I have no doubt whatever on that point.

33,594. And on the whole criticism in the Legislature has been helpful?—Yes, and it has now become constructive. It is tiresome, no doubt, but of that I make no complaint.

33,595. All Parliamentary criticism is, but on the whole it acts for good?—Yes.

33,596. You are not a Secretary to Government, are you?—No.

33,597. On page 2 you say: "Removal of responsibility for the investigation of the fundamental problems of agriculture from the Council would, in my opinion, have a deadening effect on provincial development." I wonder whether anybody had suggested anything of that sort?—It occurred to me that it would be a likely thing to suggest. In fact it was first conveyed to my mind by some notes which came into my hands from the Agricultural Adviser.

33,598. The Agricultural Adviser must, of course, speak for himself, but I am sure that when you come to know the Commission a little more, you will not suspect us of any such design?—The real view was that the organisation of research on central lines and not on provincial lines would remove responsibility for the investigation of fundamental problems of agriculture from the Council.

33,599. Since you have recorded that view, I would like to ask you whether you think that in the immediate future it is probable that each Province could afford to pay the very highest class of research worker in all branches?—Yes, I think they could. It would be a gradual process, but I think that is the thing to be aimed at. I think they are just as likely to do it as any organisation in India would be.

33,600. To attract and retain the services of men of world-wide reputation?—Yes. There is no reason to suppose that the Provincial Council would be less likely to do it than the Imperial Legislature.

33,601. Do you think that they could provide a sufficient salary for each of them?—I have suggested how they could be assisted to achieve this end later on, but I think there is no reason to suppose that it could not be done.

33,602. You think also that they could provide the security necessary to attract the type of man which you and I are thinking of?—Yes, I can only repeat what I said just now that there is no reason to suppose that the Provincial Council is less likely than the Imperial Legislature to do it.

33,603. On page 6, Question 1, you suggest that the problem of nitrogen fixation by the cyanamide and other processes should be investigated? That is the sort of research which you suggest the Central Government should be responsible for?—Yes, that is a suitable thing for an All-India investigation.

33,604. And that, I think you will agree, would require a man of first class capacity?—Yes, but it is, if I may use the expression, a short-term research which would last, say, for four or five years. It is not going to be anything like the fundamental researches into the agricultural conditions of the Province which would last for twenty years.

33,605. What is your view as regards the touch between Province and Province? Do you think you are getting all the information that you would like from other Provinces?—Yes. I have no reason to think that we are not getting any information that is going round.

33,606. Do you feel, on the point of co-ordination, that any further degree of touch between Province and Province might result in an increase in efficiency and research and a decrease in expenditure?—Co-ordination is no doubt desirable to a certain extent. It is really the way in which it is done that matters. But I am inclined to the view that the beneficial results to be obtained by an elaborate organisation for co-ordination are somewhat over-estimated. Again, I have gathered the idea from reading various notes and minutes that have come into my hands that a small

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Imperial staff of a limited size working as a team can do all that is required. That is the idea I have gathered, but that is not enough. What we want in India is many teams. And it seems to me that merely to apply to a continent like India a principle which works for a very small country like Denmark is wrong.

33,607. If further co-ordination up to a point is in your view desirable, how do you suggest that that should be obtained?—I think it will best be obtained, in fact the only way to obtain it, is by a small permanent staff of Development Commissioners or Agricultural Commissioners under the Government of India. I am not in favour of an advisory committee. If you want co-ordination, what you want is a small permanent body of Agricultural Commissioners or Development Commissioners to co-ordinate the work. Advisory Committees do not work in India. The distance is too great. I have myself been a member of the Indian Central Cotton Committee since its inception, and I have never yet been able to attend the meetings. I have not been permitted to do so.

33,608. *Sir Henry Lawrence*: Permitted by whom?—By my duties. The last meeting was on the 24th, and the Council was sitting at that time, and it was impossible to leave.

33,609. *The Chairman*: Taking up your own idea of a Central Development Commission, whence do you think such a Commission might draw its authority? From the prestige of its members or from some funds at their disposal?—I think I have dealt with that in my answers to the various questions.

33,610. I thought you would be able to condense that in answer to my question?—I can only repeat what I have said in my note. I have dealt with it pretty fully in answer to Question I (b), and I have also dealt with it in answer to the question on Administration. I can only develop what I have already said there.

33,611. I understand from what you have written, you think that it is essential that such a Central Development Commission should have certain funds at its disposal?—My idea is that the Government of India should help, and I understand they are desirous of helping. If that is so, I hold very strongly the view that they should help schemes which the Minister has approved and placed before the Legislative Council.

33,612. Do you think it would be reasonable for your Central Development Commission, when they were considering a scheme which had been put up by a Provincial Government, to suggest to such Provincial Government that a part of their scheme was really a problem that was already being dealt with by some other Province and to invite the Province making the application to agree to leave that particular section of the problem to the other Province?—It will be quite open for them to do so, and if the Province were unwilling to do that, and a grant was in consequence refused, no one could object.

33,613. There would be no interference?—That would not be the type of interference that I am referring to. It is quite open to the Government through their properly constituted authorities to say, "We will not give you the grant."

33,614. Taking another possibility, do you think it would be reasonable if the Central Development Commission said to the Provincial Government, "We have looked into this scheme, and provided you agree to one or two points, we will give you a grant representing such and such percentage of the total expenditure year by year for five years. But we will re-examine the problem again in two years' time, and satisfy ourselves that you have followed our advice"?—Certainly, there can be no objection whatever to the proposal. It is just as much within the powers of the Local Government to say, "We decline to accept your offer; we will get the money

from our own Legislature." The main point of my idea is that the Provincial Legislature is the final authority for deciding what shall, or shall not, be done in the Province for development of all kinds; that is the central part of my scheme.

33,615. Is it not then really the case that any scheme which does not satisfy the Provincial Government is doomed to failure from the start?—May I just elaborate it a little bit more? Supposing that you set up a central organisation with research stations in the Provinces, as was proposed in a note which came into my hands, nothing in the suggestion could prevent the local Legislature from entertaining a research staff if they wished to do so, and that they would do so I have not the slightest doubt, and therefore you would have two bodies at the same time. Government would be powerless to stop it. They will have their own provincial research organisation, and there will be the Imperial research organisation, and you will get exactly what you are getting now with Pusa and the Provinces, excepting you spread Pusa about; that is all.

33,616. That might conceivably involve waste of funds and effort?—Yes.

33,617. But even that would not involve interference with the administration of the Provincial Departments of Agriculture or of the field of provincial administration, would it?—It would simply be, taking India as a whole, a waste.

33,618. Before we leave that subject I should like to ask you whether you have formed any views about the working of the Indian Central Cotton Committee. That is typical of the organisation of research by crops and not by areas, is it not? Would you like to tell us anything about that?—This Cotton Committee for financing research is still in the experimental stage and it remains yet to be seen whether it will lead to fruitful results or not. They have only initiated a lot of schemes, and, beyond restrictive legislative, that is about all that has been done. They have prepared a scheme in the United Provinces, and we would have proceeded just in the same way even without that; and there are certain complications which have already arisen. For instance, they insist on the money which they grant being treated as an excluded fund; that is to say, it does not pass through the provincial accounts, and this expenditure is not submitted to the Legislative Council although it is part of a scheme for which they are providing about 80 per cent. That in itself, I think, is wrong.

33,619. *Sir Henry Lawrence*: What percentage?—I am not quite sure about it, but I should say it is about 80 per cent.

33,620. *The Chairman*: From public revenues?—Yes. To be perfectly on the safe side, I will say 60 per cent.; it does not affect my argument. This is a scheme of research for which the Provinces are contributing about 60 per cent., and they wish to go on with that scheme, but they do not wish the expenditure which they have provided to be criticised or to go in any way before the Legislative Council; that in itself is wrong in principle and likely to land us into trouble.

33,621. *Sir Henry Lawrence*: That 60 per cent. is placed at the disposal of the Central Cotton Committee, is it?—No. We are carrying out a scheme in the United Provinces which is costing a certain sum of money. Sixty per cent. or more of that is in the provincial budget; the remaining amount is contributed by the Provincial Cotton Committee.

33,622. *Sir James MacKenna*: Has that scheme been originated by the Local Government or by the Central Cotton Committee?—The scheme has been originated by the Local Government.

33,623. What is the complaint?—There is no complaint. The point is that I consider the Council should know how much money is being taken year by year for the scheme and they should be able to see what assistance

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they are getting from outside. The whole thing should go before them; otherwise I think it is a mistake and it will tend to make the Council hostile.

33,624. *The Chairman*: The control of the Council over the spending of the money that the Council provides out of public revenues is not in question?—No.

33,625. *Professor Gangulee*: Has that scheme been already taken up?—It is in progress; there is a discussion about that; it has not yet been definitely settled.

33,626. *Sir Henry Lawrence*: What is approximately the sum so far spent on these cotton experiments? Is it a large sum?—Yes, it is a large sum; I should think it is roughly about Rs.80,000.

33,627. *The Chairman*: At the top of page 3 in answer to Question 1 you say: "It seems to me, therefore, that if the Government of India desires to advance the agricultural development of the Province it should be prepared to assist the Local Government with their agricultural budgets when they are unable to present full demands for research work to the Council owing to financial stringency or any other cause." That suggestion, I suppose, is part of the suggestion which we discussed a moment ago that such funds should be definitely allocated to particular purposes?—I did really intend to raise another question that in the case of the Provinces having deficit budgets they should be supplemented.

33,628. Your suggestion is that the Government of India fund should be provided without being hypothecated to any particular subject?—That is rather what I wanted to suggest; and that in extreme cases, not as a general rule.

33,629. On page 3, Question 1, you tell us that you are not quite satisfied with the progress that you are making in research in certain directions. You say: "We have at the present time young officers working on rice, cotton, barley, oil seeds and fibre crops and potatoes." Are these officers Indian or European?—Indian.

33,630. Does that suggest to you that the research officers that you are getting have not been trained in the right way?—No; it merely suggests to me that we are putting young officers on to tackle a problem when they are too inexperienced.

33,631. Have they had the post-graduate training required?—I think, with one exception, they have had post-graduate training, although I think most of them will not be able to tackle those problems without detailed expert guidance. It would be like taking a lot of boys fresh from college and putting them on some of the most difficult problems in the world and expecting them to solve them. It is really absurd.

33,632. Do you think you can get in India the necessary lead?—I doubt it. I am afraid we should have to go to America probably to get it. I do not think you will get it from England.

33,633. You would include England in your search?—Yes, I would include the world.

33,634. Do you think you could carry public opinion and opinion in the Council in making appointments of that sort?—That is very uncertain, I think. At the present moment I can, but one can never tell what view may be taken.

33,635. But it is a very important line of work?—It is very important.

33,636. I suppose there is no feeling at the back of your mind that this paragraph in your note of evidence reinforces the case for a central organisation capable of directing the best type of research worker?—Exactly the same argument applies to it.

33,637. Turning to your answer on page 6 to Question 1, "Research into the expenditure of irrigation water," I want to be quite certain as to the position of the responsibility as between your department and the Irrigation Department. Is it the case that, at the moment, well irrigation is entirely under you?—Yes, wholly; that is to say, the development of it.

33,638. On its technical side as well?—Yes.

33,639. Is that a good plan, in your judgment?—Yes, I think it is working very well.

33,640. Would you rather keep that than see the responsibility passed on to the Irrigation Department?—Yes; on the whole, I think I would, because it is very intimately connected with the introduction of intensive agriculture.

33,641. Question 2, Agricultural Education: in the second last paragraph, you are talking of the relation between primary education and agricultural advance. Would you agree that literacy amongst a higher proportion of cultivators is a great desideratum?—Yes. My personal experience is that when you are demonstrating or introducing anything, it is the educated boy who always comes to the front.

33,642. Do you think there is some danger that the desire to introduce what is called an agricultural bias into primary education may, to some extent, interfere with the work of equipping the primary school children with literacy, the three R's?—I am inclined to think that the whole attention should be devoted to literacy.

33,643. They can learn the business of agriculture a little later?—They know it already, as much as they can know at that age. There is no child in the countryside without a knowledge of these things.

33,644. Taking the points in the order of your note; first, about the Bulandshahr school scheme which is described in the course of the provincial memorandum entitled "Report on Agriculture in the United Provinces,"* which was prepared for the Commission some months ago, I should like to ask you on that: are accurate records of the after careers of the boys being kept?—We have only had two classes passed out.

33,645. So that it is just beginning?—Yes.

33,646. Do you attach great importance to the keeping of accurate records of the after careers of the boys?—Yes, as far as it is possible to maintain them.

33,647. In the last but one paragraph on page 8, in answer to Question 2, you give us the total cost of the Bulandshahr school on its non-recurring side as Rs. 2·75 lakhs, and the recurring expenditure as about Rs.29,000. What do you gauge as the cost per student?—It can be obtained by calculation. There are 40 students.

33,648. Do you know how that compares with the cost of similar institutions in other Provinces?—I think there are no similar institutions in other Provinces.

33,649. How does it compare with the Loni school?—I should say that the Loni school is not like it. It is not well equipped, and is not of such a high standard.

33,650. *Dr. Hyder*: You have been to Loni?—No, but I know the details about the age of the boys, &c.

33,651. And the equipment?—Yes, and the equipment; it is not of such a high standard.

33,652. You have not seen it?—I have not seen it. I base my remarks on what I have been told about it by its founder.

33,653. *The Chairman*: At a cost of something over Rs.500, I take it that it is only the boy of commanding position in life or special capacity who is worth that money?—I should be very sorry to say so.

* Not printed.

33,654. On the technical side, do you contemplate the extension of schools on a system of this sort?—Yes, to deal with these particular boys.

33,655. Why these particular boys?—They are the sons of the larger tenants or the smaller zamindars.

33,656. Are they in a special position?—Yes.

33,657. Do any of the boys who pass from the Bulandshahr school have the advantage of a higher system of education?—No.

33,658. Is there any English at all?—Very little; not sufficient to qualify them for the University course.

33,659. Do you feel yourself that the fact that the boy cannot go on lessens the attraction of the school?—It lessens the attraction of the school to a certain number, of course.

33,660. But not to the type that you want?—Not to the type we want.

33,661. I do not know whether we have been provided with the figures of the wastage between the bottom and the top of that school. Could you give us any indication as to what are the figures of wastage?—I do not think that those figures have been provided. I cannot give exact figures, but I think it is very little; probably three or four drop out during the course.

33,662. Would you let us have figures as to the number of boys who enter and the number of boys who leave, class by class?—Yes, certainly.

33,663. So far as you know, that has not been a serious problem?—No, certainly not.

33,664. How old are the boys when they join?—They are rather old; from 16 to 17; they are getting a little younger now. The average age is 19.

33,665. Are the teachers at this school graduates of your Agricultural College?—Yes. A few special teachers, such as for book-keeping and engineering, are not graduates of the Agricultural College, but the others are.

33,666. How about the teachers in the vernacular middle schools in which agricultural training is given?—They are trained at the Bulandshahr school.

33,667. Do you think there is room for an expansion of the vernacular middle school, with agricultural training and also special English, if anybody wishes to take it to make it possible for him to go to the high school?—Are you talking about agricultural education in vernacular middle schools as part of the school curriculum?

33,668. Yes?—I think there is undoubtedly both the desire and the need for an extension of that.

33,669. Is that rather the direction in which you would expect popular demand among the mass of the cultivators to move in the future?—Very few cultivators care for that. I am not an expert on education, but I do not think there are many cultivators who get to these vernacular middle schools. The plan is that they leave the primary school at class II.

33,670. On page 10 of your answer to Question 2, I see that you grant degrees?—It is not a degree; it is a diploma.

33,671. There is no actual link with the University?—No.

33,672. Do you think it might be well if you could grant a degree?—I think it would be well to be affiliated to a University. We have had committees of various sorts on it, and I think it would be an advantage, and I also think it will come. The situation has changed.

33,673. Is there any difficulty?—The only difficulty was that in the United Provinces there was no University to which to affiliate the college. All the Universities have been teaching Universities.

33,674. It does not matter much whether the University is near at hand, or far away?—There was no University in these Provinces to affiliate it to. Now they are going to have one, and the agricultural college will be affiliated to it. Allahabad, Lucknow, and Benares are not affiliating Universities.

33,675. It is not essential that the University should be in the Provinces, although it is desirable?—No; it might be London.

33,676. On page 10 of your answer to Question 2, you say: "In my opinion it would all be to the good if a larger proportion of these had a training such as given at the Agricultural College." Have you ever thought over the possibility of instituting a degree of Rural Economics in the Universities?—I have not; it has never come up, but I take it that a degree in Rural Economics would be very similar to our degree in Agriculture.

33,677. Except that one envisages such a degree course as being in rural economics in the broadest sense?—Yes, it would be a very good development.

33,678. *Professor Gangulee*: Do you teach agricultural economics in the Agricultural College?—Yes, not very well or very deeply; there is no Professor of Agricultural Economics. The merest study of agriculture must involve the study of some kind of economics.

33,679. *The Chairman*: In answer to Question 3 on demonstration and propaganda, you give us a very complete and interesting account of the development on this particular side of your work in the Province. Do you find there is a growing demand from cultivators for help and advice?—Yes, undoubtedly.

33,680. Do you think that is growing pretty quickly?—Undoubtedly. The great danger is in giving out something that is not good enough; more harm can be done by inexperienced demonstration than by anything in the world.

33,681. Do you think there is work to be done in the direction of accurate costing of farming operations on units typical of the holdings held by cultivators?—Yes; it is very difficult, but it is really a necessity; we are trying to introduce it into the farms first of all; we find some difficulty in doing it there, but we are trying to do that already, and of course we shall extend it. We want to extend it; it is of course a secondary essential.

33,682. Are you attempting demonstration by means of persuading a cultivator to undertake a particular experiment at your risk, as it were?—No, we are not; our general line is to hire a piece of land and to do it well in front of the cultivator. To anybody acquainted with India the other method opens up such vast fields that I do not think it would be wise.

33,683. That is what I expected you to say; the difficulties of assessing the position afterwards would be almost insuperable?—Yes. We have done it to a certain extent on *batai*, which is something of the same kind, but I should not like to set out on a demonstration in which we should say, "We will make up for you what you think you ought to have got."

33,684. It might be rather a premium on failure. On Question 4, page 17, you point out that the total expenditure of the Central Government on the Pusa Institute is 8-36 lakhs. I wanted to be certain what was in your mind there. You regard that as a very small sum?—I do not say it is a small sum to spend on Pusa, but what I say is it is a small contribution to agricultural research.

33,685. As you point out, that does not, of course, include the veterinary side, nor I think does it include the cost of the special work at Coimbatore?—I am not sure, but I think it does.

33,686. Then perhaps I am wrong there. On Question 7, Fragmentation of Holdings: is undue fragmentation, the result of sub-division, a burning problem in this Province?—I do not think fragmentation as understood here is a very burning problem, but I should think a very important problem is the decrease in the size of holdings.

33,687. That is difficult to avoid under the present system of inheritance. You would distinguish between fragmentation and sub-division, of course?—

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It varies greatly in different parts of the Province, but, as I say, it is there, and we manage to get over it somehow or other; it is not so great an evil as is, I think, generally supposed.

33,688. *Dr. Hyder*: Have you got any statistical information on which you are basing these statements?—No, these are the results of my own personal observations; they are not based on strict statistical examination, and before I express a strong opinion I should want to see the economics of a fragmented and consolidated holding worked out; I do not see how otherwise you could arrive at any conclusion.

33,689. And that has not been worked out?—No, that has not been worked out.

33,690. *The Chairman*: Has there been any survey conducted in any part of the Province to discover what is in fact the size of the holdings?—Yes. I cannot give you very full information with regard to these matters, which are of a semi-revenue character, but I think you will find all the information supplied in the last chapter of the Report.

33,691. All the information that is available?—Yes. I am not an authority on revenue matters; I can only give very limited information, mostly based on personal observations.

33,692. On Question 8, Irrigation, are you satisfied that there is a sufficiently close touch and understanding between your own department and the Irrigation Department?—Yes.

33,693. You told the Commission some moments ago that you were responsible for well irrigation up to a point; do you carry your advice in that matter into the problem of the actual lift, the apparatus for lifting the water out of the well?—Yes, of course; that comes into the construction of power pumping plant; it is considered in every estimate that is given for a power pumping plant.

33,694. What is the view of your department on that point in relation to the small well?—Do you mean the well of small discharge?

33,695. Yes. Are you working out any particular class of lift here? Is it mostly by bullock power that water is being lifted?—From the small well by Persian wheel and bullocks, and from the tube well, of course, by power pumping plant.

33,696. Is it your view that there is a field for research in that direction?—Yes. I should say it is not one of the most pressing problems; I do not know whether anything will be found very much cheaper.

33,696a. Do you think there is much opening in this Province for minor irrigation schemes such as the damming of streams or the construction of small tanks?—Yes; it is very limited; there is very little water left anywhere, I understand. Small pumping schemes can be made; we have in various parts banded up small streams and made small pumping schemes, but they are very limited.

33,697. The subsoil water is the best source?—The subsoil water is the best unexploited source.

33,698. Do you cover the ordinary village drinking water well in your responsibility?—No; many of the wells are used for drinking, but that is the sphere of the well-boring section of the Public Health Department.

33,699. We are debarred by our terms of reference from inquiring into the charges for water, but is there anything you would like to say about the method of charge?—For canal irrigation?

33,700. Yes?—No, I do not wish to say anything.

33,701. From your answer to Question 8, I understand that Government subsidise the construction of tube wells and pumping plant to the extent of

Rs. 6,000 per well; I suppose that is worked out on an average?—Yes, it is an approximate figure, of course, but the overhead charges last year came to Rs. 4,987.

33,702. But are the wells so subsidised the 673 and 510 wells mentioned on page 19?—No, those are different sorts of wells; those are tube wells.

33,703. You say: "The total borings made were 673, out of which 510 were successful." None of those are tube wells?—No.

33,704. I am interested in what you say on page 21 in answer to Question 8; you point out that well irrigation is really not a business proposition unless you go in for intensive cultivation. Do you know the net return in profit per acre which is required to finance the ordinary well? Quite obviously it depends upon the water discharge in relation to the cost of the well, and so on; but have you any general figure?—No, we have not got sufficiently accurate figures to bring forward; we are getting them.

33,705. That will be an important and interesting line of research?—Yes.

33,706. What is the source of power in this group of wells mentioned in the last paragraph but one?—It is to be electric. Do you mean the actual source of power?

33,707. Yes, the prime mover?—Oil.

33,708. On Question 9 as to wells, I think you are building up something in the nature of a record of soil analysis?—Yes, we have got the records.

33,709. Would you attach importance to an organised soil survey?—No.

33,710. On Question 10, Fertilisers, what is the limiting factor in this Province?—Ignorance of their use I should think.

33,711. Not a particular deficiency?—No.

33,712. What is the particular deficiency in soil in this Province?—Nitrogen and phosphorus.

33,713. Is the phosphate deficiency general?—It is universal. There is a phosphate deficiency all over India. The foods are deficient in phosphates, the children are deficient in phosphates. It is one of the ills of India.

33,714. On the question of preventing the fraudulent adulteration of fertilisers, you are concerned to see that the chemical substances imported and sold as manure are of standard quality. Have you any facts that you can put before the Commission on this question?—I have every reason to believe that nothing has been imported, but if a large trade develops it is very likely that it would be done.

33,715. *Professor Gangulee*: These fertilisers are sold on a unit basis?—Yes.

33,716. *The Chairman*: With regard to this question of seed distribution, Question 11, you find the Co-operative Department very ready to help you, do you?—They are ready, but their efforts have not been very successful at present because they have no organisation and they have not undertaken the production and distribution of seed. Distribution is very important and everybody knows that, but if you are going to build up an organisation it must be production *plus* distribution.

33,717. While on that point, may I ask you whether you are using the co-operative organisation for propaganda purposes at all?—Very little at present. But I am not quite sure as to what you mean by propaganda?

33,718. I mean propaganda in the widest sense, that is whether you were putting out information through the co-operative organisation?—Not up to the present. We are contemplating it.

33,719. Supposing you desire to distribute a leaflet for dealing with, let us say, a plant pest?—Yes, we have, but I think any propaganda of that sort would not reach one cultivator in 5,000.

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33,720. I suppose you do publish a certain amount of literature of that sort in the vernacular?—We publish the Journal in the vernacular, but I would not say that it is done on such a large scale as obtains in Bombay or Madras. In my opinion, there is only one possible way of education if that education is to be of any use, and that is by showing that you can do something better than the cultivator can do it himself.

33,721. And also to show him that your method is sufficiently better than his own to make it worth his while?—Yes.

33,722. I have one or two questions to ask you about agricultural indebtedness. Has there been a survey of indebtedness in the Provinces?—No. I am afraid I know very little of this subject and can give you no useful information.

33,723. Would you attach importance to such a survey being carried out?—Yes. It would be a desirable thing, but I am not prepared to go further than that.

33,724. Do you think it would be well if there could be established in this country, on a commercial basis, seed merchants such as we have in Great Britain?—Undoubtedly.

33,725. Is there any hope of such merchants being established?—We hope that our aided private farms will develop into agencies for this.

33,726. Without at the same time developing into moneylenders?—It is very difficult to say; I could not give an answer to that question.

33,727. Seed merchants in Great Britain occasionally lend money?—Yes, it is all done on the system of advances. We hope that our system of private farms will develop into small seed agencies.

33,728. Have you anything that you wish to say about the railway services?—No.

33,729. Have you no particular suggestions to make as to the building of new branch lines in any particular district?—I wish to make no representation on that point.

33,730. And about road communications other than those which you have mentioned in connection with marketing?—No. I think the programme of the Board of Communications is very good and the full demand could not be met for many years.

33,731. *Sir Gunga Ram*: Is there a separate Board of Communications?—Yes, dealing with provincial communications of all kinds.

33,732. *The Chairman*: Including the general survey of roads under local authorities?—Yes; the Board of Communications take the grants given for communications into their purview.

33,733. And after that their power of stimulating the local authority diminishes, I suppose?—Yes.

33,734. Have you any views on the value which the Metereological Department of the Government of India might be to the Province?—I think that on the whole the Metereological Department gives us very valuable and useful advice. I think it is one of the most efficient scientific departments in India and I value its assistance very much.

33,735. Is there anything that you would like to say about the grant of loans from public funds?—I think I have dealt with that under *taccavi*, and there is nothing more I wish to say, except that the drawback of *taccavi* is the delay necessarily involved in getting it. We are taking measures to stop that.

33,736. Do you form the view that applications for *taccavi* loans are unreasonably turned down?—No, on the whole, I should say that applications for the grant of *taccavi* receive very generous and very fair consideration.

33,737. *Sir Henry Lawrence*: Is there much complaint here of corruption and leakage?—Not over large grants of *taccavi*; but occasionally over small grants.

33,738. *The Chairman*: With regard to the Veterinary Services, Question 15, are you satisfied with the degree of co-operation which exists between your own department and the Veterinary Department?—Yes; I should say that there is as much co-operation as one can expect to get between two technical departments.

33,739. Is there anything that you would like to say about veterinary education?—No. I am afraid that is a subject on which I am not qualified to speak.

33,740. Do you meet the Veterinary Department at meetings of the Provincial Board of Agriculture?—Yes; our points of contact are two: the Provincial Board of Agriculture and the Cattle Committee.

33,741. How often does the Provincial Board of Agriculture meet?—Four times a year.

33,742. Is that enough in your judgment?—It is ample.

33,743. You consider the development of cattle breeding under a special officer as one of the successful efforts of the Agricultural Department. Can you give the Commission any indication of the effects which this successful effort has had on the quality of the cattle?—What I based my knowledge on was the stimulated interest in improved cattle breeding. There is a tremendous interest taken in cattle breeding and, what is a striking evidence, is the controlled breeding areas which have been established. That, I think, is the most promising of the cattle breeding efforts.

33,744. And the movement, in your judgment, does show life?—More life, I should say, than any of our other activities at the moment.

33,745. Probably you would rather not deal with the question of fodder?—I think it would be of no use my dealing with it except in a very general way as regards the administration.

33,746. You make some interesting suggestions under your answer on pages 32-3 to Question 17 (d), Agricultural Industries?—Before we consider this I should like to make an alteration. The cost of machinery should be Rs.2,25,000, instead of Rs.2,00,000, and the sum stated as interest and depreciation should be increased in proportion.

33,747. Is there a proposal before the Government to take any such step as that which you suggest?—No, but I think I can very easily get such a proposal passed when I make it.

33,748. Would you be competing with any commercial undertaking?—No, we should go out of our way to remove ourselves from competition with the smaller industries, whom we should try to get to join us. I hope the Commission will be able to see at Hardoi what we are doing in this direction.

33,749. Is it your suggestion that a central institution of the sort which you suggest in your answer should be utilised for experiments of various kinds in connection with sugar?—No, the experiment is a self-contained experiment to see if a small unit will work satisfactorily. I do not propose that we should carry out experiments on different kinds of cane; all I wish is that we should work it to see if it can be adopted in this country.

33,750. Have you anything to say about spare-time occupations as against agricultural industries in the bigger sense?—No. It is a most difficult and complicated subject.

33,751. I wanted to ask you how long ago these facts have been collected? Are they the result of an enquiry of some years?—They have been collected in the last five or six months.

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33,752. Do you think at this stage of development a fuller investigation of the position would be justified?—Honestly speaking, I do not think so; I do not think it will lead us very much further for the present.

33,753. In the description of the system of marketing wheat at the primary market, I see from page 33 that wheat is sold direct to the *bania*. Does no broker intervene?—Not at that stage; not in the primary market I am thinking of. They just take the carts up to the small village shop, really speaking, and dump it down there.

33,754. Then on page 34 you say: "It is difficult to distinguish at sight between cases in which the *arhatia* acts as a commission agent and as a purchaser using his own money"?—It is difficult because they would not tell you.

33,755. Is not that rather a vicious practice, combining agency work with operations as a merchant?—Yes.

33,756. Do you think there is any advantage in licensing commission agents?—It would be an advantage, but it is impossible.

33,757. Are they licensed in municipal markets at present?—I think they are at present; but the moment anything happens they go out elsewhere.

33,758. You give, on page 35, the marketing charges of 100 maunds of wheat passing through the market. Would there be any municipal tax on that wheat coming into the market?—There would be an octroi charge, of course, if it were a municipality.

33,759. Do the octroi charges vary between town and town?—I do not know; I do not think they vary largely; but that is information which can easily be got if you wish to have it.

33,760. I think it will be helpful if you could give us the octroi charges at typical markets in the various parts of the Province?—Yes.*

33,761. You suggested a moment ago that much could be done in the future by a collection of accurate and detailed facts of the position. Do you attach importance to this question at this stage of development?—Not a great deal, no. It will be very expensive; it will be a very difficult enquiry. I can only see one way of doing it, and that is by appointing somebody with training in economics to carry out the village enquiry, taking the crops of the village and tracing the product right through; and even then things would be concealed.

33,762. How about your dealings with the Forestry Department?—We have scarcely ever come into contact.

33,763. And where you do are you satisfied?—Yes. The only point where we have come into contact is for the utilisation of *usar* patches, and I have referred to it.

33,764. On the question of agricultural labour, is there a shortage of labour in the Province?—No.

33,765. Is there much migration from this Province?—I think emigration has been just reopened, but I am not sure about it.

33,766. To Assam?—Yes; but I am not quite sure.

33,767. With regard to Question 22 on Co-operation, I gather that you are in agreement with the general trend of the recommendations of the Committee *ad hoc* which examined the co-operative organisation in the Province, and you think that meantime the attention of the department might well be devoted to putting the rural credit societies on a sound basis?—Yes; I think that is the chief thing.

33,768. I asked you some time ago on another point, as to the touch between your own and the Co-operative Department, and I think you told us that it was as sympathetic as you could wish?—Yes.

* See Appendix II.

† The Oakden Committee.

33,769. Would you attach importance to economic surveys of villages, quite apart from the question of marketing, which we were talking about a moment ago?—I should have a full economic enquiry into a whole group of villages; that is the first thing to be done. There are plenty of students now trained in the various schools of economics who could do it.

33,770. Judging from several points in your note, it is your view that the landlord classes are beginning to take a more active interest in agriculture as a whole, is it so?—I think we have now enlisted the assistance of the landholders; large scale operations on modern methods are increasing rapidly. Ten years ago there were 30 farms, and to-day there are 621 private farms. We are inducing them to produce pure seed for distribution to the cultivator. During the last 15 months the owners of private farms have undertaken to produce 20,400 maunds of seed.

33,771. *Professor Ganqulee*: Are these farms owned by large landowners?—Not necessarily large landholders.

33,772. *Dr. Hyder*: When did this come about?—It has been a gradual process.

33,773. The figures for 1926 are included?—Yes.

33,774. I want to know whether the year 1926 had any particular influence on the creation of these farms, because that is not included in our terms of reference?—The rate of increase in 1926, when the tenancy legislation was introduced, was normal; it is a normal increase. ,

33,775. *Sir Ganga Ram*: Do you include gardens in that?—No.

33,776. *The Chairman*: Are you faced with water-logging problems in the Province?—To a certain extent, and I think, as I said in discussing the drainage, that it will become a serious problem in some of the canal areas; it has been taken up very vigorously by the Canal Department, and I think the steps taken are adequate; but the water level is rising in those tracts.

33,777. Before I ask any of my colleagues to question you, I should like to turn to your answer to Question 2 on page 8. The statement that you there give of the recurring expenditure in the Bulandshahr school works out at about Rs.480 per head, while in the analysis of the provincial budget which you have given the Commission it is said to be Rs.183. Probably there is some simple explanation of this discrepancy?—That is the cost of the farm, not the cost of the whole training.

33,778. Rs.183 would be part of it?—Yes.

33,779. *Raja of Parlakimedi*: You say the students trained in this Bulandshahr Agricultural School go back to their fields?—I said that they go back to the occupations which they would take up if they had not come to the school, but better equipped.

33,780. How do you keep yourselves in touch with them?—Through the demonstrators, through the local inspectors and so on.

33,781. Do they constantly apply for seed?—Not constantly; they do so at first; but gradually they become self-supporting.

33,782. Do you yourself go about much in the rural tracts?—Yes.

33,783. What is the tendency you observe at present among the cultivators? Is there any appreciable tendency for taking up improved methods?—Immediate appreciation of demonstration of superior technical skill is a thing I notice at the moment. It varies. In the eastern districts it is very much less than in the western districts. It is greatest in the western districts, where the people are well off, better educated and in better health, and it is lowest in Gorakhpur.

33,784. Does it also depend upon the demonstration farms you have in these areas?—It depends upon the quality of the work, yes. Nothing is so

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quickly ridiculed in rural areas in all countries as bad farming. Everything depends upon the quality of the work.

33,785. In those areas where improved methods of cultivation enjoy greater popularity, have you got more farms and better demonstrators?—No, I should say the quality of our work is on a general level. Certain districts I am not satisfied with, but taking it as a whole there is a level in all big agricultural tracts.

33,786. As far as your experience goes, are you satisfied with what has been done by the department?—No, certainly not. I am far from satisfied.

33,787. What are the implements that are most popular among the cultivators as a rule?—Ploughs. Harrows are also coming into popularity.

33,788. Are the parts easily replaceable?—Yes, there are ploughs in existence which can be mended by the village blacksmith.

33,789. And are there depôts?—Yes. Every seed depôt is also an implement depôt.

33,790. How many depôts do you have per district?—I cannot answer that. Probably three or four.

33,791. Are definite figures prescribed for each district?—No. It is left to us to supply them where the demand is sufficient.

33,792. In agricultural vernacular middle schools are the boys taught geography?—No. They are taught only agricultural chemistry, botany, agricultural engineering, a little mathematics and English; not geography.

33,793. Are they given instruction about marketing?—Yes, they are. A rather novel feature of the school is that they cultivate plots of their own. Groups of boys cultivate nearly five acres of land and take their produce to the nearest market, e.g., Khurja, and sell it there. They learn a great deal about marketing.

33,794. Have they been told about the nearest market, and of the markets which have the greatest demand for different crops?—They know that already.

33,795. Have they a fair knowledge of the neighbouring markets?—Very wide indeed, some of them.

33,796. In the rural parts do these people who come back from your school lead a better style of life, I mean, do they adopt a higher standard of living?—I really have no statistics to go on. As far as my experience goes, such as are personal friends of mine have been very much improved by going to school. It all depends on what you take as your standard. Some of them wear better clothes.

33,797. Can they be said to be setting an example to their neighbours? Are they taking their place as rural leaders?—That I should say is very definite; as rural leaders they are very satisfactory and exercising a very good influence. That of course is the aim of the school, to enable them to take their place as rural leaders.

33,798. Do you invite them to go round to the different farms?—They go whether we invite them or not.

33,799. And thus try to improve their knowledge?—Yes. They are very keen on keeping in touch with things.

33,800. As we have in the Madras Presidency, do you have any farms where there are honorary visitors?—We have Farm Committees.

33,801. I mean, people who take an interest in agriculture?—Everybody in the Province is an honorary visitor in that sense, but the policy of the farm is controlled by the Farm Committee.

33,802. When people go there they are shown round?—Yes, but the Farm Committee exercises definite influence on the policy of the farm, the work that is done, the programme and so forth.

33,803. Is that information circulated among the people?—No, not in print.

33,804. Not even in vernacular papers?—To a certain extent, but the conditions of this Province are vastly different to those of Madras, for example, that the circulation of pamphlets would not touch one man out of five thousand or even ten thousand. It is only by example and by teaching that we can do something.

33,805. Not even in those areas where people are taking more interest in agriculture?—Where they are educated, even, I doubt if they will take the trouble to read a complicated thing requiring a lot of understanding. I do not attach much importance to the diffusion of knowledge by means of writing. I attach far more importance to example.

33,806. *Sir James MacKenna*: I think you have been the representative of the United Provinces on the Central Cotton Committee since the committee was started, but have not been able to attend any meetings. Do you not think, in those circumstances, it would be wise to recommend Government to nominate some other officer?—Yes, I had contemplated doing that, but I gather they consider I am keeping in close touch with the work of that Committee through the numerous volumes of proceedings, &c., which they publish. Scarcely a day passes but I receive a large amount of printed matter.

33,807. I do not quite appreciate your difficulties with reference to the procedure of that Committee. What is the line that they follow? Does not the scheme originate in the Province?—Yes; the scheme originates in this way. We propose (that is, I propose; Government does not make proposals) a scheme and they make a grant. They accept the scheme and then make a grant. The money is treated as an excluded fund; it cannot appear in the provincial accounts, and the Legislative Council have no opportunity of criticising my action in accepting that grant.

33,808. What would be the difficulty there?—Some people might consider that an advantage. I consider it a disadvantage, in that all our work should come in some form or other within the purview of the Legislative Council.

33,809. Do you think there is interference with Ministerial control?—I think there is no interference at present, but I think there is a situation which might very well develop into interference. I have nothing to complain of at present, but I think the chances are such that it might occur.

33,810. Is it not rather like looking a gift horse in the mouth? Do you think there is a serious difficulty?—I think there is a disadvantage. The friendly attitude of the local Council, I am convinced, is due to the fact that all our activities are without hesitation placed freely before it, and any action which tends in any way to convey an impression that we are not placing our activities before it is a disadvantage.

33,811. I want to ask you about the recruitment of Deputy Directors. Are all your Deputy Directors recruited from men who are trained overseas?—No. We have no permanent Indian Deputy Directors. Our present Indian staff are people who have been permitted to take over the duties temporarily by the Government of India. They are not Deputy Directors; they are local officers whom we have been allowed to put in as stop-gaps, but are not allowed to confirm.

33,812. Have you no Indian Deputy Directors recruited before the Lee Commission's recommendations?—Yes, one.

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33,813. What are your views about the training of Indians for superior posts in the Agriculture Service? What is the best method of training?—I cannot give a general answer to that. If you take me stage by stage it will be easier.

33,814. It has been suggested in various places that probably the best method of recruitment is from men who have graduated or taken diplomas in a local college, then worked for two or three years in the department, and then given a "brushing up" either at Home or somewhere else and then promoted?—I agree with that, except that I take exception to the "brushing up." They want a general course in agriculture up to the M.Sc. stage (as I have put it, in the absence of any better phrase). It is a bad way of expressing it, but I think it conveys what I want to say. Certainly I should take strong exception to "brushing up."

33,815. I am prepared to accept your view of it. But would you develop your ideas about Pusa as a teaching centre? What do you suggest for these people?—I should suggest a general agricultural course of a higher standard than is given at present, including applied chemistry, applied entomology, dairy work, agricultural engineering, the use of machinery, agricultural economics; a general course in agriculture.

33,816. What at Home would be called an honours course, I suppose?—Yes, which would fit him to be a Deputy Director. A Deputy Director wants to know more than pure agriculture; he wants to gain a wider knowledge of applied chemistry, entomology, and a whole variety of things.

33,817. A more advanced course in the subjects he has taken in the provincial college?—Yes, from a broader point of view altogether. He wants a broader training.

33,818. Supposing you are training a man as an agricultural chemist would you give him a similar broad course with special emphasis on chemistry?—I think the cheapest way would be to send him to England. I maintain that they can learn agriculture better in India itself, under Indian conditions, however.

33,819. What about botany? Would you do the same in this case as for chemistry?—If you have a very outstanding botanist at Pusa, they might be trained there, but at present the best thing to do is to send them to England.

33,820. I understand that when you were appointed as Director of Agriculture you stipulated that you should be allowed to continue your research in sugarcane?—Yes, and that I was to have charge of a Circle. I consider it as of first class importance that the Director should be in touch with agricultural conditions.

33,821. Where are your headquarters?—At Shahjahanpur. I have just been for two months on tour to Shahjahanpur. My office, however, is here.

33,822. Do you find it makes administration more difficult?—No. On the other hand, I find it makes it much more pleasant.

33,823. The bulk of your canes are irrigated, and you are growing thick canes?—They are not thick canes.

33,824. It is irrigated, any way?—Yes.

33,825. What about Coimbatore canes?—We have had a lot of them.

33,826. How are they doing?—Pretty well, but the general opinion I have formed is that Coimbatore has not yet reached the degree of excellence that similar work has reached in Java.

33,827. You have visited Java as a member of the Sugar Committee?—Yes.

33,828. What are the relations between the Coimbatore Cane-breeding Station and these Provinces? Has there been any difficulty?—There has

been no difficulty. They send up their canes to us for trial. I have seen some publications of theirs in which they have stated what they are prepared to work out. They do not offer to be consulted; they work out their schemes of their own accord.

33,829. They send them up to you and the department tries them?— Sometimes they send the canes to me, and sometimes to the Western Circle, in charge of Dr. Parr.

33,830. You do not think they have proved their superiority as yet?— They have proved their superiority over the *deshi* canes undoubtedly, but I should say that the plant breeding work at Coimbatore has not reached the degree of excellence that it has reached in Java.

33,831. What is your view of the Central Board of Agriculture?— I should say, as low as it is possible to be.

33,832. No use at all?— None at all, and a positive impediment, I should have thought myself.

33,833. What are your reasons for that?— We get nothing of value out of it.

33,834. Your reason is that it is purely advisory? It is a bad advisory board.

33,835. Have you any experience of these sectional meetings which are concerned only with particular branches of the science? Do you not attend any of them?—

Sir Henry Lawrence: Do you attend the meetings of the Central Board of Agriculture?— Yes, when I am ordered to do so.

33,836. *Sir James MacKenna*: Do you not think that there might be some good in the sectional meetings of Botanists and Chemists?— I should not be prepared to go so far as to say that; there would be no harm in them.

33,837. *Professor Gangulee*: With regard to your remarks about Pusa being converted into a post-graduate training institution, why do you wish to confine the teaching to the M.Sc. standard?— As I have said before, I only use that as a very loose phrase. I should substitute that by anything. I merely suggested the M.Sc. standard in reply to Sir James MacKenna about higher training.

33,838. You are in favour of creating facilities at Pusa for higher training of selected students from the agricultural colleges?— Not necessarily from agricultural colleges; from anywhere.

33,839. In order to raise the status of Pusa to that of a central college of the sort that you propose here, would you suggest that you would have to have men of a higher standard as teachers and research workers?— Teachers chiefly, I should think.

33,840. And you suggest that the cost of the post-graduate training should be borne by the Central Government?— Yes.

33,841. In order to convert Pusa into a centre for post-graduate training, do you not think that a research atmosphere is fundamentally necessary?— Yes, and it is a matter of deciding how a research atmosphere can be created in an educational institution.

33,842. Can you develop an educational institution of the nature that you want to develop without proper research facilities?— You cannot. What I said was that you have got to develop a research atmosphere, and the point for discussion is how you are going to develop that research atmosphere.

33,843. You are agreed upon having Pusa as a central post-graduate college, but you say here that the research activities at Pusa are bound

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to decline?—I mean by that that the research activities at Pusa for the solution of economic problems in the Provinces would decrease. For instance, the activity in relation to the production of wheat for the United Provinces and other activities of that kind are bound to disappear; the question that you are wishing to discuss is how to create a research atmosphere at Pusa.

33,844. Provided we have men of outstanding ability and scientific reputation from anywhere coming to Pusa, we can create that atmosphere?—Yes. You need not necessarily create it by investigating economic problems in Madras, the United Provinces or the Punjab.

33,845. Organised research work in this Province, I understand, was commenced from 1912?—Yes, about that time, or a little later perhaps.

33,846. It was started about 14 years ago?—Yes.

33,847. Has there been a systematic survey of important agricultural problems?—Yes. I am not quite sure that I understand you. Do you mean whether we have gone round the Province to see what we can best investigate?

33,848. What were the outstanding problems before you?—The outstanding problems before the botanical section were plant breeding and the investigation of genetics.

33,849. Was there any survey before you undertook any scheme of research?—There was a survey; that is to say, we held meetings and discussed the matter. We cannot say that we set out round the Province; what was wanted to be done was common knowledge.

33,850. Do you have a programme of research drawn up before you commence?—Yes.

33,851. Supposing a programme is drawn up for an Agricultural Chemist, what is the actual procedure?—The programme is submitted to me. If I consider it necessary, it is submitted to the Board of Agriculture.

33,852. The Provincial Board of Agriculture?—Yes; and it is approved or not approved by them, and the method is discussed by them and then carried out.

33,853. That has been the method?—Yes.

33,854. With reference to all sections, the chemical, the botanical, and so on?—Yes.

33,855. Your first attention was directed to crop improvement by selection?—No.

33,856. What was your first item of research?—Improvement of the cotton crop by cross-fertilisation.

33,857. Was it because of the lines of research then being carried out in Pusa by Mr. Howard?—No. I did not do this work personally; it was done by one of my colleagues.

33,858. Your first attention was directed to the improvement of the cotton crop by hybridisation. What was the result of that work?—The result was an accumulation of a large quantity of very valuable scientific information and the production of a number of improved varieties.

33,859. Have you obtained any variety by hybridisation?—Yes, several.

33,860. What varieties?—A variety of cotton; its number is 402.

33,861. Are you distributing seeds of that cotton?—We are not distributing; we are now engaged in the mass production of seed.

33,862. Was the result of your hybridisation work this, that you got one variety of improved cotton?—We have got more; I am taking one as an example.

33,863. Then you undertook cotton improvement by selection?—Yes, in the department.

33,864. Your selection produced a better yielding type of cotton known as Aligarh 19?—Yes.

33,865. In connection with you selection and hybridisation work, did you receive any assistance from Pusa?—As far as my personal knowledge goes, none.

33,866. How does Aligarh 19 compare with the local varieties in yield?—Do you mind if I consult my colleague?

(Dr. A. E. Parr, Deputy Director of Agriculture, Western Circle, replied to Questions 33,867-33,874 inclusive.)

33,867. How does Aligarh 19, which you have evolved by selection, compare with the local varieties, first in yield and second in staple?—It is about the same in staple, and I should say, roughly, over a period of five years, about 20 per cent. higher in yield.

33,868. Higher than the local varieties?—Yes, which it is quickly replacing.

33,869. Does this evolved Aligarh 19 obtain a premium price in the market?—It is sold at a premium merely on account of its colour, not on account of its staple or anything else. It has two advantages, its high yield, and it is sold at a premium on account of its colour.

33,870. Do you distribute the seed of Aligarh 19?—That, I understand, is done in other circles; I am in charge of the Western Circle.

33,871. Any other variety?—Not at present.

33,872. So that, the seed of type 402 which you have got from hybridisation, is not distributed?—I believe it is being distributed in some of the circles, but not in the circle that I am in charge of at present.

33,873. So, the main result hitherto obtained from your cotton work is Aligarh 19?—Yes.

33,874. Has anything been done to study the various soil conditions in the growth of this particular variety of cotton, to see whether the higher yield is due to the selection work or due to the variation in soil conditions?—Of course, we grow it under a variety of conditions. I have a large number of farms in my circle, and I test it. At the same time, I agree with your suggestion that in certain soil conditions it would not yield so well. The United Provinces, as far as cotton is concerned, may be divided into many tracts, and I do not think that you will ever get one type which will be successful everywhere. This is the type peculiarly suited to the dry and hard conditions of the west of the Province.

33,875. *Mr. Clarke:* May I suggest that detailed questions with regard to the records of yield, &c., should be reserved for examination tomorrow?

33,876. *Professor Gangulee:* (to *Mr. Clarke*) With regard to wheat, would you like me to question Dr. Parr?—General questions I am prepared to answer.

33,877. You have already stated, in reply to the Chairman, that there has not been a systematic soil survey in the Province, and you have stated that it is not necessary. Is not such a survey quite helpful in soil investigation work?—I do not consider it is so.

33,878. You do not think that a soil survey helps in any way?—I am not prepared to make a general statement like that about soil survey, but in these Provinces I do not consider that a soil survey is necessary.

33,879. Your soils are rich in potash and lime and deficient in phosphates. Is your department carrying on researches on the availability of various

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phosphatic manures for growing crops?—I consider that there is enough general information on that subject to keep us going for a good length of time, and special researches are not required at the moment.

33,880. You have not carried out any researches?—No.

33,881. What is your view with regard to the export of bones?—From the purely agricultural point of view there can be no doubt that it would be much better to keep all the phosphorus there is in the country; whether it would be sound from a fiscal point of view I am not prepared to say.

33,882. From the agricultural point of view, you would like to prohibit the export of bone meal?—Yes, undoubtedly.

33,883. Do you find any indication of bone meal being extensively used as manure in this Province?—Not extensively; it is coming into use.

33,884. I understand sulphate of ammonia is being used increasingly?—Yes, it is coming in slowly and gradually.

33,885. In all your experimental stations, are you carrying on any experiments to show the influence of various manures, firstly on yield, and secondly on the quality of the crop?—Yes, we are now beginning. Since fertilisers became a practical and workable proposition we have begun that.

33,886. So that you have not sufficient data yet?—No, we have not. All these experiments, as I have said in my evidence, are extremely difficult to carry out, and they are expensive because an experiment which does not cover a considerable area is of no value. The old style of agricultural experiment on odd plots here and there is perfectly useless.

33,887. In the provincial memorandum* submitted to us, you state that the manurial problem is at present a nitrogen problem. Has it been possible for your research workers to study this nitrogen problem in all its bearings?—Do you mean with regard to the recuperative processes at work in the soil.

33,888. That is the biological factor; I am speaking first of all of the conservation of soil nitrogen?—That is recuperation.

33,889. And then there is the chemical factor of nitrogen fixation?—Do you mean the recuperative processes at work in the soil?

33,890. Yes?—It is being investigated.

33,891. You have a Soil Biologist here?—No, our Agricultural Chemist is competent to do that work.

33,892. Is he doing it?—Yes.

33,893. So that you are studying this question from the point of view of soil biology?—Yes, it can be studied from no other point of view.

33,894. There are other things: soil texture may be taken into consideration and bio-chemical factors may be involved?—It is all in relation to the bio-chemical factors.

33,895. You have no Soil Physicist working in your research station?—No.

33,896. From what point of view have you been studying the problem of alkaline land? In your note you do not make any reference to any scientific investigation?—In answer to that question, may I refer you to the answer to Question 9 (a) (ii) on page 22?

33,897. I follow that. You have been telling us about this reclamation work and my question was directed to ascertaining whether you have adequate knowledge of the formation of alkaline soils?—Not complete knowledge.

33,898. Particularly with reference to the influence of irrigation?—No, I should not say we have complete knowledge.

* Report on Agriculture in the United Provinces (not printed).

33,899. Soil investigation in the United Provinces with a view to obtaining some knowledge as regards the formation of alkaline soil, and with particular reference to the influence of irrigation, is most important. Among the various items of research work to which you have referred to-day, you have mentioned your cotton work, your soil work, and so on; I want to know whether there has been continuity of research work; that is to say, whether, when you have taken up a problem you have seen it through?—Those that have been continued are regarded as having been satisfactorily completed; those that are discontinued are still incomplete, of course.

33,900. Do you not think that investigations of inter-provincial importance, such as this alkaline question or the identification of pests and diseases, could be organised by a central station working in co-operation with one or more provincial experimental stations?—No, I prefer the problems to be undertaken provincially.

33,901. You would not like to see a central institution carrying on work on such fundamental problems giving you the results; and you repeat the experiments on your own farm and test the results?—I do not think such a course is possible.

33,902. In the provincial memorandum* on page 32, paragraph 162, you say that the main lines of work on which the demonstration and district staff are engaged at present is seed distribution. What definite results has your department produced which you can demonstrate? You have mentioned cotton, Aligarh 19. What else?—Wheat.

33,903. Pusa No 4?—No, Pusa No. 12.

33,904. Pusa No. 4 and No. 12?—Cawnpore No. 13 wheat, certain types of barley, certain types of fibre crops, sugarcane of various types.

33,905. But in this Province about 7½ million acres is under rice, is it not?—It is given here; the crop is worth 41 crores.

33,906. So that no attempt has hitherto been made to produce a better and heavier yielding variety of rice?—Yes, an attempt has been made.

33,907. So that you have at present to demonstrate these improved seeds, and you tell us that 71,000 maunds of seed were distributed last year?—Yes. I will give you a later figure. 105,000 maunds.

33,908. Would you kindly tell us what crops?—Yes. I cannot give you them now, but you will find that in the annual Administration Report.

33,909. We have not got that before us. As to the area under improved seed, something like 500,000 acres are under wheat?—Yes; the later figures are: 750,000 acres under wheat and 200,000 under cotton.

33,910. Could you give us an idea what percentage of the total area of these crops has been affected by these improved varieties?—You can tell; the total area of wheat is known and is in publications which have been placed before the Commission.

33,911. You have not got those figures?—I have not got those figures with me, nor can I on the spur of the moment calculate them out.

33,912. *Mr. Calvert*: Would you accept 7 per cent. as a fair figure for the total?—I cannot say until I have worked them out; it is a very simple calculation if you have got the figures before you

33,913. *Professor Gangulee*: Under the heading of Demonstration, on page 20, paragraph 104 of the provincial memorandum,* it says: "In 1921 Government decided that demonstration farms must be run on commercial lines." Are these farms being run on commercial lines?—Yes.

33,914. What precisely do you mean by "commercial lines"?—That is to say their audited accounts must show a profit.

* Ibid.

33,915. By whom are the costings checked?—By a qualified auditor and accountant.

33,916. Is demonstration on the cultivator's own field more expensive than on the Government farms?—No, I should say not.

33,917. You made a reference to a Provincial Board of Agriculture. What are its functions?—Its functions are laid down in the Government Resolution*; they are to advise Government on all matters that are placed before it connected with agriculture; that is its chief function; also to distribute grants to District Boards for small schemes of agricultural development.

33,918. It has funds at its disposal?—Yes.

33,919. Does it consist of officials or non-officials?—Both officials and non-officials.

33,920. On the Provincial Board of Agriculture are departments such as that of Irrigation, Co-operation and Education represented?—The Education Department is not represented; Co-operation and Irrigation are.

33,921. Have you any district agricultural organisation?—Yes.

33,922. In all the districts?—Not in all, in 23.

33,923. What are their functions and how are they related to your Board?—Their programmes of work are submitted to the Board of Agriculture for consideration, grants are made to them, and their work is supervised.

33,924. Local committees are mentioned in this note?—They are farm committees.

33,925. Who appoints those farm committees?—Government.

33,926. What is the nature of the work of these committees?—They review the work of the farm, settle the programme and consider the budget.

33,927. Are the actual cultivators of the particular local area represented on these committees?—Yes.

33,928. In view of the reference in the first two pages of your *précis* to political reforms, I should like to ask you if you think India is likely to move to some form of federal government?—I am really not prepared to say. I wish that political questions of that nature should not be asked.

33,929. I am not asking political questions. I just wanted to know whether the centralised system of agricultural research was flourishing in such countries where there was a federal form of government?—I do not know anything about that.

33,930. You have not closely studied the organisation of the United States of America?—No. I have already said that I have not made a study of the agricultural methods of the United States.

33,931. *Mr. Calvert*: There are in this Report on Agriculture† certain statements on the economics of agriculture. Are they based on definite enquiries? Paragraph 23 at page 8 of the Report on Agriculture says: "A considerable area is cultivated by village artisans and others, who may be called allotment holders; after making due allowance for these, it has been estimated that the size of the average holding in the western districts is 6½ acres." Are those based on enquiry, or is it mere guessing?—They are not based on a very thorough enquiry. One of them is based on an enquiry made by the late Director of Agriculture, Mr. Hailey. That is the one which refers to the eastern districts. If you will combine that information with the information given in the last chapter of this report, it will give you an idea as to where it is obtained from. A lot of it as regards the west of the Province

* Government of the United Provinces—Revenue Department, Resolution No. 298/1—241, dated the 7th February, 1919. (See Appendix I.)

† Report on Agriculture in the United Provinces (not printed).

was obtained by Mr. Lane, who has been very recently occupied with settlement work, and, as regards the east of the Province, on Mr. Hailey's information, which is based merely on general observations. You are referring to the areas, I take it?

33,932. One statement is: "The decrease in size of fields and farms continues as they pass from father to son." I want to know whether that is the actual fact or whether it is merely guessing?—It is merely a general observation; it is based on my own observation in many tracts.

33,933. Does that mean that the number of cultivators is increasing faster than the cultivated areas?—Undoubtedly; our census figures show that.

33,934. It is stated that an owner does not as a rule cultivate any area himself? At what stage does he usually stop with one pair of bullocks?—He may have, say, a piece of land of 50 acres or 70 acres. It is seldom more than 50, no matter how big an area he has.

33,935. Does the amount of land cultivated by one pair of bullocks normally fix the extent of this area?—Not at all.

33,936. On this question of sub-soil water, is there usually sufficient sub-soil water in a well to enable the soil to stand heavy irrigation?—The sub-soil water level has risen 15 feet in the last ten years.

33,937. Reference is made on page 13, paragraph 59 of the Report,* to immoderate water-lifting?—(Dr. Parr): Perhaps I may say that my point was this, that water lifts very slowly, and it is easily conceivable that in any definite tracts you can lift more water and make use of water of that level quite easily.

33,938. On the question of this Bulandshahr school, my calculation works out to round about Rs.1160 per pupil. Is that a fairly accurate figure?—(Mr. Clarke): I should think that that is not far out.

33,939. This has been described, I think, as an attempt to provide a system of education and instruction which will fit the man for his station in life. I was wondering whether education costing Rs. 1160 was suitable for the tenant and small zamindar for whom this school is intended?—I see no reason why it makes it unsuitable.

33,940. Do you think that you would be able to increase the number of these schools throughout the Province?—Yes, there is a decided demand for them. In Council the other day two more were demanded.

33,941. Was that based on the knowledge of the total cost per pupil?—Yes, also on a full and detailed discussion of the cost of the existing school and the work done by it.

33,942. The number of tenants, we are told, is about six millions. Is your Council prepared to extend the school to cover these six million tenants?—I should not think so. That is an unreasonable proposition.

33,943. Are there any Brahmins or *Thakurs* in that school?—Yes.

33,944. Are they allowed to go to that school? Are they not prevented by their caste from doing ploughing and manuring?—I am perfectly certain that there are a large number of *Thakurs*.

33,945. Can these relatively small but substantial zamindars for whom this school has been created not afford to pay the fees for that school?—Small fees are paid as far as I remember.

33,946. But they are not prepared to pay the full fees to cover the cost?—No. It is not the policy of the Government to run the school on those lines.

33,947. Your college is intended for the larger landowners? Do they pay fees?—Yes.

* Ibid.

33,948. Does that fee cover the cost?—No. The same policy applies here. It is not the policy of Government to run their educational institutions on commercial lines.

33,949. With regard to the use of the word "demand" for such schools: that is not a demand for education for which they have got to pay?—No, it is a demand for the education provided by the Government.

33,950. With regard to this question of seed distribution, Question 11, you say your seed distribution was carried out at a profit. Is that a profit after paying for all the cost of distribution?—The balance-sheet in the last annual report includes all the cost of supervision except that of the superior and supervising staff.

33,951. Including storage charges?—Yes.

33,952. Interest on the capital charge of the seed stores?—I rather think it does, because many of them up to the present are in hired buildings. It will certainly include the rent of the hired buildings.

33,953. On page 27 you say that each seed store holds 2,000 maunds of grain. That brings up the cost of your seed store to one rupee per acre?—Yes.

33,954. You still do that at a profit?—We have not very many central seed stores at present; we have only 19 of them out of 127 seed stores.

33,955. What I want to know is to what extent Government can continue to build these seed stores at this rate of one rupee per acre?—We have a very large margin. We do not want to carry it on at a profit. We would be quite ready to get rid of Rs. 1,44,000 profit by building seed stores and ensuring the proper condition of the seed.

33,956. Is that the type of seed store you recommend for adoption by the co-operative societies?—Yes.

33,957. Do you find your cultivators are willing to pay a premium for good seed?—Yes; the present position of the seed distribution is that of a service for the benefit of which users are willing to pay us a premium in much the same way as the users of municipal water are willing to pay for a commodity which could be obtained for nothing if quality is not considered.

33,958. You do not find that consideration of its higher price deters the cultivators from buying your seed?—We cannot say that it does; we distribute all that we get and we could distribute much more.

33,959. Would you kindly explain your reference on page 20 to the Government subsidy for the construction of tube wells? It is Rs.6,000, and the average irrigated area is round about 150 acres. The Government subsidy works out at about Rs.40 per acre?—Yes, if the calculation is correct.

33,960. And the running interest charge would be Rs.2-6-0 per acre?—Yes.

33,961. Is the reason why the Government give a large subsidy just to popularise the tube wells?—No; Government have accepted the responsibility of developing all sources of underground water as a source of irrigation supply.

33,962. Do you know whether Government propose to recoup themselves by enhancing land revenue on this irrigated land?—No; I am unable to say that.

33,963. It is a little difficult to understand how Government can continue to find this capital cost of Rs.40 per acre?—I do not know how Government propose to recoup themselves; but they are satisfied at the moment with the high prosperity that is brought about by the intensive cultivation that follows the installation of tube wells.

33,964. But the land revenue in this Province is less than Rs.2-6-0 per acre, and they are increasing yearly the recurring cost?—I am unable to throw any light on that.

33,965. There is no limit to this subsidy at present?—It is limited to 50 tube wells annually. The demand is very great for them and it will no doubt increase.

33,966. Are you in a position to tell us to what extent these attempts to reclaim the ravine land at Etwa are giving a good return in fodder?—No; I am unable to say; I do not know the conditions.

33,967. On the question of consolidation, have you formed your view after comparing the cultivators in a consolidated village with those in an unconsolidated village?—No. A really authoritative opinion cannot be expressed until an economic enquiry is held.

33,968. In your budget you have put down a small sum for import duties; would you kindly tell us what the import duties are?—As far as I know it is a financial arrangement recently come into operation; it is the duty on imported stores for scientific apparatus in the college and things like that.

33,969. Have you not tried to move for the exemption of duty on such apparatus?—I understand it is a matter of financial convenience.

33,970. Is there no duty on imported seed?—We have never imported any seed.

33,971. Not imported berseem?—No; I do not think we have imported any.

33,972. *Mr. Kamat*: On page 3, Question 1, you say: "There is a dearth of experienced workers for the problems connected with plant breeding and crop-improvement. This is traceable in part to the long delay in deciding on what basis permanent recruitment to the higher posts (including research posts) should be made. The question is still unsettled and the rules delegating powers to the Local Government are being reconsidered by the Secretary of State." I understood that after the recommendations of the Lee Commission this question was settled; but you say it is still unsettled?—I understand the exact mode in which the recruitment should be made is not yet settled; the powers to be given to the Local Government are not yet settled.

33,973. What are the rules which, you say, are being reconsidered by the Secretary of State in this respect?—The rules delegating powers to the Local Government to appoint officers to the higher posts of the Agricultural Service.

33,974. May I ask you if these are the rules which are being reconsidered?—That is my information.

33,975. Are they in any way in conflict with the recommendations of the Lee Commission, or are they in consonance with them?—I form no opinion on that.

33,976. Until these rules are finally settled, you will not be able to do any recruitment?—I understand no action is being taken until these rules are finally settled.

33,977. May I know further whether this circular about recruitment which the United Provinces Government has received from the Government of India applies to all the Provinces or whether it applies only to this Province?—That I do not know; I cannot tell you.

33,978. You said that in your six circles you had six Deputy Directors. May I know how many of these are Europeans and how many Indians?—Two are Europeans and four are Indians.

33,979. In this Province amongst the list of official witnesses we do not see the name of any Indian Deputy Director; is that purely accidental?—Yes, as far as I know it is completely accidental.

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33,980. Because in other Provinces we have had the benefit of hearing the Indian Deputy Directors?—I understand you have received written evidence from all the Deputy Directors. The Questionnaire was sent to all Deputy Directors.

33,981. What I would like to know is whether the department gave an opportunity to all the Indian Deputy Directors to have their say, if they wished to?—Certainly. They had copies of the Questionnaire, which, I understand, have been answered and returned directly to the Secretaries of the Commission. The Commission has power to call them if they wish to do so.

33,982. That is not precisely what I mean. They were given, no doubt, the opportunity to send their written statement; but were they given the opportunity to appear before the Commission if they wished to do so?—I do not think I can say any more than that they had as much opportunity as any other person.

33,983. Talking about this scheme of yours regarding research, you wish to have the research work provincialised. On the other hand, in a note supplied to this Commission by the Government of India, or rather by the Liaison Officer, we have been told that if the Provinces arranged for research, progress might be slow. Do you wish, really speaking, that the Provinces should be absolutely self-contained in the matter of research?—Yes; I should prefer to see the Provinces self-contained in the matter of research and in all matters relating to agricultural development.

33,984. By self-contained, you mean that they should make no reference to the Imperial Institute at Pusa?—Not necessarily; I do not say that they should make no reference.

33,985. No reference should be made by them either for advice or for assistance; is not that what you mean?—What I mean is that they should be in a position to undertake investigations of all their major problems of provincial importance.

33,986. In that case what remains for the Imperial Institute to do, say, in the case of rice or sugarcane?—With regard to rice, I think it is a problem which is of sufficient importance to justify having a team of workers of our own to solve our own problems ourselves.

33,987. You do not think that there will be overlapping in, for instance, research on rice; Bengal is engaged in it and so also is Bombay?—There will be a certain amount of duplication of course, but I do not think duplication will be entirely a disadvantage.

33,988. You would not consider that duplication as a waste of time or energy?—No; I do not think so; I do not think it would take the form of waste of time and energy.

33,989. Supposing the three Provinces, the United Provinces, Bengal and Bombay are engaged in research on rice, who is to co-ordinate the work? Even for that, do you not want any assistance from Pusa or any other agency?—My view with regard to this is that, for the problems for which I have taken rice as an example, there is ample scope for investigation for more than one team of workers.

33,990. Quite so. Judged from the importance of rice to this Province your remarks are quite justified from one point of view; but when three Provinces are also carrying out the same work should there not be some co-ordination?—The necessary co-ordination, which is limited, could be carried out by an Agricultural Commissioner or a Development Commissioner with the Government of India.

33,991. In other words you do not wish to have a Central Advisory Board for co-ordination?—No.

33,992. You want one, two or three Development Commissioners?—Yes, permanent technical officials.

33,993. You think two or three permanent officials will be able to deal with all the different crops of India?—They are quite as competent to co-ordinate the work as, for example, the Development Commissioners in England.

33,994. They will have to be assisted by Committees or Bureaux?—No; I do not think so; I do not think they would require any assistance.

33,995. You are not in favour of these Committees or Bureaux?—I am in favour of a limited amount of co-ordination which could be obtained by permanent technical officials.

33,996. A scheme for an All-India organisation has been proposed for our consideration. I wonder whether you have read that?—No, I have not.

33,997. The outline of that scheme is that there should be an All-India organisation with the Viceroy at the head as Patron, with a number of Ministers, experts and general public, zamindars and even Indian Rulers to do propaganda work and also to carry on general advisory work in the matter of agricultural development? Are you in favour of such a scheme?—I do not know enough details of it; it depends upon the propaganda and it depends upon a variety of things. I cannot express an opinion off-hand.

33,998. You have no faith in an All-India organisation?—I would not say that; what I say is, that with the knowledge I have, I am not prepared to express an opinion.

33,999. When you propose that Pusa should be a teaching institution, may I ask whether the present Imperial officers who are doing the research work there should be transferred to the Provinces for research work and new experts for teaching work should be recruited in their place?—I do not think that necessarily follows.

34,000. Who will do the teaching work at Pusa, and who will do the research work?—Surely the present staff should be able to do the teaching work.

34,001. They should be converted into teachers and professors?—I do not think it is a matter of conversion. They are as much teachers as they are research workers.

34,002. For the Provinces, at any rate, you will have to recruit research officers of reputation?—Yes. We hope to be able to do so. It is a question of supply and demand; I do not know whether we can get them.

34,003. That is what follows from your proposals?—Yes.

34,004. Talking about agricultural education, your idea is that Deputy Collectors, Tahsildars and even Police Officers should be men who have had agricultural training in the Agricultural College. Do I understand you aright?—In my opinion, it would all be to the good if a larger proportion of these had a training such as given at the Agricultural College. It would afford them a wider insight into, and give them a wider knowledge and sympathy with, the many problems and difficulties of the agricultural classes. Recruits who have received the type of university education in science and arts now given do not always possess these. If a larger number of executive officers such as Deputy Collectors and Tahsildars and even Police Officers were recruited from the Agricultural College, I think we should find agricultural progress accelerated.

34,005. Do you not think it would be putting a premium on the training given at the Agricultural College for Government service?—Not if the number were limited.

34,006. But, in another place, you have expressed your view against guaranteeing posts to agricultural school men?—That is for the agricultural school, not for the Agricultural College.

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34,007. Do you think that a wholesome principle?—I think it would be a good thing for the Agricultural College (if it is developed on the lines on which we wish to develop it, but for an agricultural vocational school it is not right to have such a principle.

34,008. Why do you accept the principle in one case and not in the other?—The Agricultural College is giving training of a University character, but the agricultural school is giving training purely of a vocational character.

34,009. In answer to Question 17 (d), on page 33, talking about the manufacture of sugar as an industry by modern methods, you think that an experimental plant costing about Rs.1,23,000 would be a business proposition as a model for the people to follow?—It would cost Rs.2,25,000.

34,010. Have you made any effort to obtain from the Local Government a grant for this amount?—Not yet.

34,011. Do you think it would be worth while to attempt it?—Yes, I certainly think so.

34,012. Especially in view of the fact that sugarcane in the United Provinces is a large crop?—The scheme is not based on the establishment of one unit; it is based on the establishment of many units. What I say is that one experimental unit must be tried before we can recommend the establishment of a chain of units.

34,013. But even for one unit, it has not yet been tried?—No. We have the specifications and full details of it in hand.

34,014. Talking about improved seed and the additional profit therefrom, have you ever estimated what the net additional yield per acre is from the use of the improved seed?—Experiments are being conducted with regard to sugarcane only. The outturn tests show that 32 maunds of *gur* per acre is the normal yield of indigenous sugarcane in this Province. With a very little improvement in cultivation and better varieties, you can produce 60 maunds of *gur* per acre, and with improved varieties and intensive cultivation you can go up to 100 maunds of *gur* per acre.

34,015. So that the net additional profit is about Rs.42 an acre?—No; I am talking about the quantity of *gur*.

34,016. *Sir Ganga Ram*: With Government canes?—Coimbatore, Java and various other improved canes.

34,017. *Mr. Kamat*: On page 125 of the Report on Agriculture in the United Provinces there is a statement showing the yield in lbs. per acre of different crops during the last ten years. Taking the two crops, wheat and rice, if you take the figures of yield from 1914 to 1924, is that a steady upward curve?—Of course it is not; I can see that the figures vary considerably.

34,018. Even at first sight, it does not show that it is a steady upward curve?—Would it equally suit your purpose if I take a crop with which I am familiar, for instance, sugarcane?

34,019. I do not know whether it is the most favourable crop. Why not take rice?—It happens to be a crop with which I am not familiar.

34,020. I am prepared to take rice or wheat. In 1914, the yield of wheat per acre was 933 lbs. During the next ten years it has not distinctly gone above that, and in 1923-24 it is 817. Take again the next important crop, rice. Ten years ago the yield per acre was 734 lbs.; it has not gone up steadily. On the contrary, in some years it has gone down, and in 1923-24 it was 627 lbs., which is much less than in 1914-15. Now if you say that your improved seed has given you a decided profit, how do you account for the figures in this statement?—The real explanation is that these returns are based on a series of outturn tests in which the results of the use of improved seeds have not yet been incorporated.

34,021. Then, there is a statement in the memorandum supplied by the Government to the effect that the Director of Agriculture estimates the additional profit derived from improved seed by the zamindars and cultivators at £1,000,000. How was that figure arrived at?—It was arrived at in this way: From the seed distributed, assuming that eight acres are grown for every seven acres grown in the previous year, we arrive at 750,000 acres grown under improved wheat. By a similar process of calculation, we have arrived at 200,000 acres under improved cotton, giving a return of Rs.15 extra per acre.

34,022. But the table of comparative yields during the last ten years which I just referred to does not support this view?—It does not, for the simple reason that the outturn tests of improved varieties are not included in it. At some future date, when the rules for outturn tests are revised, these will be included and shown. Of course, these are not absolutely correct.

34,023. You agree, therefore, that these are not quite correct?—Yes, for the simple reason that the outturn tests on which these are based do not yet include improved crops.

34,024. *Professor Gangulee*: Why was it not included?—The rules have not been changed. They ought to be included, of course, but they are not included.

34,025. *Mr. Pim*. I want to clear up two or three points in your evidence. You referred to the Board of Communications as controlling all kinds of communications. Has that Board, as a matter of fact, any money at its disposal?—I understand that it has grants from the District Boards allotted to it.

34,026. I am afraid not; I am afraid it has no money at all?—Then I was wrong.

34,027. They occasionally recommend grants, but they control nothing?—Yes.

34,028. There is a sentence on page 5 of the provincial memorandum which is perhaps too generally worded?—I may say at once that I did not prepare the memorandum.

34,029. It says: "Conversely, the higher castes, Brahmins and *Thakurs* in particular, generally make poor agriculturists. Men of these castes are handicapped by caste rules which forbid their handling of the plough, much more of course the touching of manure." That is a very general statement. Is it, as a matter of fact, true that all *Thakurs* and Brahmins cannot handle the plough?—I do not think it is the case.

34,030. You would not abide by that statement?—No. I did not write the memorandum; I should not have put it in at all.

34,031. Later on, I understood you to say that no landlord carried on private farms until very recently. Is that strictly correct?—I did not say that no landlord carried on private farms. I said, ten years ago I doubt if more than 30 private farms were in existence.

34,032. When you said that, you had in mind private farms run on improved lines?—Yes.

34,033. That does not mean that landlords did not carry on farms of their own before that?—There was nothing more than *batai* cultivation that I know of.

34,034. Do you not think that they cultivated through their own servants?—I never came across any examples of landlords cultivating through their servants; it was *batai* as a rule.

34,035. But your special reference was to farming on improved lines?—Yes; the whole thing was turning on that.

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34,036. You said that there were no agriculturists in the vernacular middle schools?—I am not aware that I said so.

34,037. I understood you to say that agriculturists did not get into those schools?—I said the ordinary village cultivator generally leaves school at about the third class of the primary school. There are a few of them who get to the agricultural middle schools.

34,038. You did not mean the cultivators in general?—I meant the cultivators the Chairman was referring to. The people who go to the Bulandshahr school get into the vernacular middle schools.

34,039. With regard to the movement of grain, you spoke of its having to pay octroi when it comes into municipal limits. Is octroi, as a matter of fact, levied in all municipalities?—I think it is. I promised a further enquiry into that.

34,040. With regard to the fragmentation of holdings, would you say that the problem was of the same kind in all parts of the Province? In certain areas of the Province, is not the land much more uniform than in certain other areas?—Fragmentation occurs much more in the east than elsewhere.

34,041. Do you not think that it is closely connected with the degree of variation in the types of soil?—Yes. I think that on a minute examination it would be found to be so. The wider the variation in the village soil, the greater would be the fragmentation.

34,042. *The Chairman*: Mr. Pim, what is the position with regard to octroi, in case any of my colleagues want to deal with it?

Mr. Pim: Some of the principal markets such as Cawnpore have terminal taxes and tolls which are practically a low octroi rate without refunds. Under the ordinary octroi rules which are in force in most of the other Municipalities, an octroi is levied on imports, but if the grain is again exported, the whole charge should be returned, so that there should be no net charge on grain which is imported and re-exported.

34,043. *The Chairman*: What is the position with regard to the cart tax?

Mr. Pim: The Municipalities do not levy a cart tax on carts bringing grain into the Municipal area the owners of which reside outside that area. They sometimes have a tax on carts living and plying within Municipal limits.

34,044. *Sir Henry Lawrence*: Could you explain a little more the point you made with regard to the Central Cotton Committee and its grant, and the disadvantage you saw in this money not being under the control of the Legislative Council? Is there in fact any such money not within the control of the Legislative Council now?—We have accepted a grant and a discussion is now proceeding as to whether this should be regarded as an excluded fund or whether it should go before the Council. The desire of the Cotton Committee is to treat it as an excluded fund.

34,045. Both their contribution and your contribution?—No, to treat their contribution only as an excluded fund.

34,046. Then in that case would the question arise of your contribution being outside the scope of the Legislative Council?—No, certainly not; it never has arisen.

34,047. I misunderstood your point; I thought you said that some provincial money was excluded?—No, that would never be so; that is impossible under the financial rules; all our money is voted by the Council and passes through the provincial accounts; but part of the contribution to this scheme does not pass through the provincial accounts, nor does it come within the purview of the Legislative Council; that in my opinion is a mistake.

34,048. That is money derived from a cotton cess, is it not?—From a tax, yes.

34,049. And not from the provincial fund in any way?—No.

34,050. And you are anticipating that the Local Council might have an objection?—I am anticipating that they would probably object to the whole of our financial proposals for that particular scheme not going before them.

34,051. That again would seem to infer that the provincial money was going to be spent without their cognisance?—No, there is no such inference. Let us suppose we spend Rs. 60,000 of provincial money on a scheme which is going to cost Rs. 80,000. These are hypothetical figures. We ask them for Rs. 60,000, but we do not say a word about the Rs. 20,000; they might take exception to our asking them for the Rs. 60,000 without saying we are getting the Rs. 20,000.

34,052. They might, but the matter has not arisen so far?—It has not arisen in Council yet, but it is now being considered.

34,053. You mentioned a permanent Development Board. What is your conception of the best scheme for this permanent Development Board?—A body of technical permanent officials who keep in touch with the local departments by frequent touring and know the type and class of work that is being done in the Provinces.

34,054. Under whom would they work?—They would be under the Government of India, presumably in the Department of Health, Education and Lands.

34,055. Would they have any authority over the local departments?—No, they could only report. I should imagine the relations would be very similar to those of the Development Commissioners in England: a grant is given to a college in England; the Commissioners go round and look at it, and if they do not approve of what is being done, they discuss that with the local authorities, and then, of course, withdraw the grant, if not satisfied.

34,056. So that what you envisage is that this Board should have certain funds provided by the Government of India?—No, the Board could not, because the Board would consist purely of officials. I was not thinking of a Board of Development; I was thinking of Agricultural Commissioners.

34,057. There might or might not be a Board; that is a matter of terms?—But I was not thinking of a Board.

34,058. But these Agricultural Commissioners would have certain funds at their disposal?—No, the Government of India should allot funds on their recommendation, which is an entirely different matter.

34,059. And these funds then should be placed at the disposal of the Local Government?—Yes, for schemes which have been approved by the Minister. It would not be a Board; I do not like the proposal of a Board with funds at its disposal.

34,060. Would there be sufficient work for the Commissioners?—Ample I think for one or two Commissioners.

34,061. How many Commissioners would you suggest?—One might be enough at first; it might be extended to two if there was too much work for one.

34,062. They should just go round and study what is being done?—Study what is being done, tell other people, and see if the money given by the Government of India is spent for the purpose for which it was allotted.

34,063. A co-ordinating agency?—An official co-ordinating agency. I think an almost similar organisation exists in England.

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34,064. And on their advice certain grants should be given. You suggest some points on which the Government of India might give grants; I notice one of them is mentioned in your answer to Question 8, page 21; it is that the Government of India should subsidise the making of tube wells. That is a matter of very local importance, is it not, for the Government of India to expend their Imperial funds upon?—I have never taken the view that Imperial funds should not be spent on matters of local importance. It is matters of local importance that do really matter. They are all matters of local importance, even the most momentous schemes.

34,065. Your proposal in regard to that attracted my attention, and now that Mr. Calvert has pointed out that this apparently means a loss of Rs.2-4-0 per acre, I thought possibly you thought that might be a very suitable matter for the Government of India to bear?—It does not mean an economic loss, because about twice as much is produced from that man's work than before the tube well was introduced; it is only a question of who is to bear the cost.

34,066. Then in the same connection, in answer to Question 11, on page 28, you mention that advances for seed distribution are met by funds provided by the Government of India. That, I understand, is the present position, is it?—Yes, that is the present position; it has been in vogue for a long time; we have about Rs.5 lakhs I understand, of which I have got Rs.2,80,000.

34,067. Is that an annual grant?—No, it is an advance.

34,068. It is a form of *taccavi*?—No, it is an advance from the Government of India to this Government. I cannot tell you the exact technical details of the financial procedure, but it is an advance.

34,069. And this Government is responsible to the Government of India for its repayment?—Yes. We have utilised that, as our balance sheet shows, at a considerable profit.

34,070. It is not a very large advance from the Government of India. In your last paragraph in answer to Question 15 you suggest that a Subordinate Veterinary Service should be organised on similar lines to that of the Subordinate Agricultural Service, and you say: "I am strengthened in this view by the results of attempts to co-operate with the agricultural committees of the District Boards with regard to the general agricultural propaganda and education." What has been the result of those attempts?—The matter was discussed at great length in the Legislative Council last week. The position is this: we have utilised District Boards in the past; we recognise that their local knowledge and advice are of great assistance to us, but we are not convinced that they are in a position to take over the functions of a technical department such as the Agricultural Department. Anybody with any experience of District Boards will not find this surprising; they are overwhelmed with the executive work in rural areas, and they have not the time to attend to the technical details necessary for agricultural work; therefore I conclude they have not the time and attention to deal with the details necessary for the control of veterinary work. We found that there are a few things that District Boards can carry out very effectively, but no success or very little success has been attained in subjects which require constant, detailed, expert supervision such as the management of experimental and demonstration farms, demonstration on cultivators' fields, the production and distribution of seed. From that experience I conclude that they do not possess the time or the capacity to develop veterinary work.

34,071. The District Boards have not so far been placed in the same position in regard to agricultural propaganda that they hold with regard to veterinary work, have they?—Not completely, not exactly the same. The analogy is great.

34,072. What have they done in matters of agricultural propaganda so far?—In 1923 we asked all District Boards to form agricultural sub-committees, and 23 out of 48 responded. In June of that year I wrote to the Chairmen of the agricultural sub-committees, asked them to prepare programmes of work, and suggested a variety of projects which they should take up. Eleven of them sent in programmes which we considered, and grants amounting to Rs.12,000 were made to enable them to carry out their work. A consideration of the first year's work, however, brought out several facts very clearly; it was found that the District Boards were successful in carrying out certain things; one was the setting up of farms for rural cattle breeding, and the other was the establishment of farms for agricultural teaching in vernacular schools.

34,073. I see in this Report on Agriculture, on page 38, it is stated that no question has attracted more public attention in recent years than that of the improvement of our cattle. Is that in accordance with your experience?—Yes.

34,074. Do you consider that public opinion is behind you in these attempts to improve the cattle?—Yes, I think it is more behind us in the attempts to improve cattle than in any of our other activities.

34,075. Your controlled breeding areas are working satisfactorily?—Yes, that is one of our most promising lines of work. The exact details of this will be given by the Deputy Director when he gives oral evidence before you; they will be found in my administration reports for 1925-26.

34,076. Can you say how many bulls you are distributing?—It is given in my memorandum and in my answers to the Questionnaire.

34,077. There is a reference here to cross-breeding for milk purposes with Ayrshire and Holstein; has that been done under your care?—It is done in the Agricultural Department, but not under my immediate technical supervision.

34,078. Then you would rather I asked somebody else about that?—I cannot answer technical questions about cattle breeding.

34,079. But, generally speaking, is that experiment working satisfactorily?—No, I was told by the Deputy Director, who will give you details of this, that the crosses are more liable to disease than other breeds.

34,080. That is the main difficulty?—Yes.

34,081. Are you demonstrating silage on all your farms?—On the cattle breeding farms and certain other farms belonging to zamindars and talukdars.

34,082. What has your experience been? Was it generally satisfactory?—It is too early yet to express a definite opinion, because it was started only two years ago.

34,083. *Sir Ganga Ram*: On page 19, Question 8, you say that you bored 673 wells and the total was 38,057 feet. That works out to 56 feet per well on the average. Can you say what was the maximum and what was the minimum?—I am afraid I am not in a position to answer that.

34,084. I see lower down that you have put down "4-inch cutting shoe." Do you put anything below as a sort of strainer?—I am afraid I cannot answer technical details of well boring.

34,085. Who would answer that?—The Agricultural Engineer has submitted a written note of evidence, and you may call him.

34,086. Is agricultural engineering not a subject in the college?—Yes.

34,087. Do you give any degrees in the college?—There is only the diploma.

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34,088. Is it your experience that these diploma holders are very much sought after by landlords?—Not very much.

34,089. Do they get any?—A few only.

34,090. What percentage?—I should think 3 or 4 per cent.

34,091. Have you any farm attached to the Agricultural College?—Yes; a large farm of 300 acres.

34,092. Are any of your students taken in the Revenue Department?—Not directly now.

34,093. You will remember, perhaps, that formerly the function of the agricultural school was to give them a sort of passport?—That was abolished in 1914.

34,094. What do the rest do?—Many of them go back into rural employments.

34,094A. Then there is no question of unemployment amongst them?—Just a little.

34,095. I suppose they often apply to you for employment?—Yes, that is so; but I do not think that they are always without employment. They are probably helping their parents in rural business.

34,096. In the Punjab we find people applying for police appointments. What I mean to say is, do your college products stick to agriculture?—I should think that they do not differ in a marked manner from the products of other Provinces.

34,097. You admit that there are problems of research (which concern all India?—Yes, there are a certain number. I have given examples.

34,098. Could you make out a list showing, for five years ahead, what problems are of an All-India nature and what of a local nature?—I fear I could not.

34,099. You could not prepare it from your experience?—No.

34,100. Have you any voice in the Board of Communications?—I used to be a member, but I do not think I am now.

34,101. Can you say from your experience whether the unmetalled roads are bridged all over in this Province?—Speaking, not as a member of the Board of Communications, but merely as a casual traveller, I think that a fairly large number of them are.

34,102. There are no unbridged roads that you know of?—Yes, I know of some.

34,103. Do you find any difficulty in travelling about for want of bridges?—In the eastern part of the Province you get pulled up occasionally, but I should say that you get pulled up far less than one would imagine.

34,104. Whom do these streams belong to? Can anyone put up a dam and irrigate his land?—I do not know the law on the subject. A good many zamindars put up a bund and if they get a cusec of water they pump it up.

34,105. Without sanction or with sanction?—I could not tell you.

34,106. You do not know if any sanction is required?—They often come to ask me to arrange for a pump to be put up.

34,107. There is a Northern India Drainage Act? Are you subject to that or not?—I do not know it and I have never heard of it.

34,108. You have never studied it?—No.

34,109. Are these yields which you have given here for *barani* canal irrigated or well irrigated areas?—This chapter was prepared by the Revenue Department, not by my department.

34,110. The yield of crops must concern you?—It is described somewhere in the manuscript.

34,111. Are these yields for three classes of land or what?—I am afraid I cannot answer that question without referring to the book. You will find your information in the crop report, a copy of which can be sent to you.

34,112. I consider your yields are very, very low as compared with other Provinces, especially with the Punjab. Perhaps 10 maunds is *barani*, not irrigated land?—We do not get those yields. This must be on unirrigated land. It is 10 on unirrigated and 15 on irrigated.

34,113. Do you suggest that you want one maund of seed per acre?—I have always sown it myself. For 20 years I have sown 82 lbs. on all my farms.

In the Punjab we use only 20 to 25, in fact, not more than 25.

34,114. Do you make *shukkar* from sugarcane?—No, only *rab* and *gur*.

34,115. All these yields are, I consider, very, very low, and so I want to know whether they are *barani* lands or irrigated lands?—That information can be supplied to you, but I cannot lay my hands on it just now. It is given somewhere in the context, and I cannot remember where it is now.

34,116. Your greatest difficulty for irrigation purposes is during the months of April and May?—Until the break of the monsoons.

34,117. What method have you considered to overcome that difficulty? Have you any proposals to that effect?—We have only used the water available in the best possible manner.

34,118. I wish to ask you for your opinion on one point. Supposing tube wells are put in by Government and worked on the co-operative system, could that be done?—Yes; if you see my answer on co-operation, you will see I have recommended it. I have given some of our activities which are suitable for co-operative organisations, irrigation by means of tube wells and pumping plant.

34,119. What I mean is, whether the co-operative system can be applied to it?—I have stated here that it is one of our activities which I recommend.

34,120. Has that been tried?—It has been tried, but it has not been successful in the two cases, not because the tube well was not good, but because the co-operative society was not successful. The society was badly organised, and it failed. Since then the tube wells have been taken over by the Agricultural Department who have made a success of it.

34,121. On page 10 of the Report on Agriculture, you say at paragraph 43 that the soils of the United Provinces are rich in potash and lime? Is that your observation or is it based on an analysis of the soil?—I might point out that you cannot observe potash.

34,122. I want to ask you whether you have analysed them?—I have analysed them myself many times.

34,123. In which part? The whole Province cannot be of the same texture?—We have analysed representative soils all over the Province, and we found all of them rich in potash and lime.

34,124. Have you found out how much chemicals each crop takes away in their *plus* and *minus* process? Have you got a list of all the crops?—I have not got a list, but it is in almost all the textbooks on agriculture.

34,125. But all textbooks differ. The American textbook says that wheat takes away 180 lbs. of nitrogen?—We have not conducted any special investigation in this Province.

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34,126. Have you carried out any investigation to ascertain what depth of water is required to mature a jute crop?—Not accurately, but we know roughly.

34,127. And what is the delta water required to mature a rice crop?—I do not know; but for sugarcane in a normal year we require about 20 inches of water in some parts of the Province and 35 in others.

34,128. What is the total rainfall?—About 40 inches.

34,129. And you cannot say anything about cotton or wheat?—I have not got the figures with me.

34,130. Can you send those figures to us?—I can get figures for wheat. I think they are given here somewhere.

34,131. May I tell you that it was represented to us in Bombay that sugarcane requires 140 inches of water?—That is not my experience. My experience is that four waterings are required in Rohilkhund *plus* the rainfall; and probably a little more in western districts, but nothing like the water they pour on in Bombay.

34,132. On page 26 of the Report on Agriculture there is reference to the further development of processes for the recovery of sulphate of ammonia from coal, as a promising line for development; is that possible in this Province where you have no coal?—Of course not. We take India as a whole here.

34,133. And what would you say would be a skilful method of obtaining nitrogen from the air in a form suitable for agriculture? Have you done anything in this line?—No, we have not done anything.

34,134. Have you given any advice to the zamindars how to cultivate the land so as to get nitrogen from the air?—No, you do not mean establishment of synthetic processes. What is referred to here is establishment of manufacturing processes.

34,135. In connection with that I asked you this question. What is the best method of cultivation for accelerating the recuperative processes?—All methods of cultivation accelerate the recuperative process; frequency of harrowing, aeration, the addition of organic matter &c.

34,136. Do the zamindars fully understand that?—I do not think they understand the theory of it, but they know the process.

34,137. If they did, the yield would be better?—Perhaps.

34,138. Have you studied the recommendations of the Irrigation Commission? Perhaps I had better not ask you that question?—You should reserve that for the proper department of Government.

34,139. But still, have you not studied the report?—I have studied some paragraphs referring to well engineering and some other paragraphs that refer to my department.

34,140. Has any improvement been observed in the direction of irrigation?—There has been a very large increase in the number of *pucca* wells.

34,141. How many acres do you think can be irrigated by one well?—It depends upon the discharge of the well. The discharge varies tremendously. Some wells yield three thousand gallons an hour, others ten thousand gallons an hour. A well which has been bored may easily give ten thousand gallons an hour.

34,142. Has that been your experience?—Yes. We have often found it necessary to put pumps on them.

34,143. *Sir Thomas Middleton*: I take it from your *précis* that you have given a good deal of thought and study to the question of recruitment of staff. How long have you been in India?—Twenty years.

34,144. How long have you been engaged in teaching duties?—Twelve years.

34,145. It is occasionally suggested to us that Indian students are lacking in powers of observation. I want to get your views as a teacher on this matter?—I have no evidence of it.

34,146. Have you evidence to the contrary, provided students are properly trained?—No. I regard the Indian students as perfectly normal. I found no difference between students I taught in England and those I taught in India. The students in India are perfectly normal.

34,147. You think that some of them have got good powers of observation and, if trained, can be converted into useful men?—Most of them.

34,148. I am referring to the normal student?—The normal student or the normal agricultural student?

34,149. The average agricultural student?—There is a distinct difference. The average agricultural student in England is, or used to be, extremely stupid.

34,150. What have you to say about the average here?—The average agricultural student is slightly better in India than in England.

34,151. Then training is required in two different directions: first training for Deputy Directors, and you have indicated that one means of training Deputy Directors would be to send them to special institutions to go through a further course in general agriculture, an M.Sc. course?—I used that term loosely in the absence of a better means of saying what I want to convey to the Commission.

34,152. In your own final course here you take up (1) agriculture, (2) botany, (3) natural sciences, and facilities for specialisation are provided by you in the fourth year in four subjects. If you were sending students from Cawnpore to another institution for the purpose of training them as Deputy Directors, in which parts of this course would you require further training?—The course requires working out in detail, but I can say broadly that agriculture, applied entomology, applied chemistry, engineering, modern dairying and things of that nature. You should not confine them to what is known as agriculture. We want to broaden their minds.

34,153. But has a Deputy Director much to do with applied chemistry?—A knowledge of it is an extremely good thing. I should think, every Deputy Director recruited to the Indian Agricultural Service has received some training in it.

34,154. You already give training in it up to a point?—I should give a little more.

34,155. Now, with reference to your specific suggestion that all these Deputy Directors should be trained in one central institution, is it not a fact that for the work a Deputy Director has to do, local training and local experience are specially important?—Yes, but the advantages and disadvantages, weighed against each other, indicate very clearly that it can only be achieved in a central institution.

34,156. Looking at the question from the point of view of the student, I should think that he would be better trained in the Province where he was to work?—I disagree. I have had great experience of these matters. What we do now is to send him to England, and he would be very much better trained at Pusa than in England.

34,157. I too have experience of training, and I should prefer a Deputy Director to be trained in his Province?—So should we if we could get a college like Pusa solely for the training of Deputy Directors, but that is a counsel of perfection which can never be followed.

34,158. From the point of view of the college, no well equipped college would like to part with their best students?—They would have parted with them by then. I do not propose they should go until they had completed their course.

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34,159. The M.Sc. is practically the honours course of an ordinary degree?—Yes.

34,160. I should have thought the colleges would wish to retain their best students?—I do not think they possess the facilities for giving them the advanced training that I want them to have.

34,161. These are some of the difficulties that have occurred to me. Yours is to be an M.Sc. course?—I would not stress that point. I mentioned the M.Sc. merely to convey to people who would otherwise have difficulty in understanding my remarks what it was.

34,162. You do recognise the fact that students working on an advanced subject like to earn a degree? It would be an advantage if there were an M.Sc. course?—Yes, it would be an advantage.

34,163. I fancy many of the Indian colleges are thinking of a time when they may, through affiliation to the Universities, be able to give the M.Sc. degree?—I think that will take many years. It would be a pity to wait for that.

34,164. Some of them are now moving in that direction? The next point in connection with the training of a Deputy Director is the age at which he will have finished his course?—22 to 23.

34,165. Could you then recruit the best of them as Deputy Directors?—Yes. We could work out a plan. We could take them into the Provincial Service for a year and select from them and send them on for higher training.

34,166. You agree that it would be necessary to give them some experience in the Provinces?—Yes. A variety of ways could be tried. If we had a very brilliant student, he might go straight on to Pusa.

34,167. At what age do you think a brilliant student would be qualified to undertake the work of a Deputy Director? How long would it take him to get the experience necessary, if trained in your own Province?—What happens now is that a Deputy Director is recruited from overseas, and comes out at the age of 24, and has to carry on somehow or other.

34,168. I take it you envisage a different type of training?—Yes, something like this. On passing out of the Agricultural College he would not be put in the Provincial Service, but in the Subordinate Agricultural Service. From that he would be selected as a suitable boy and sent to Pusa and finish about the age of 25.

34,169. Do you think that entrance to your Provincial Service should be in one grade, and that subsequent promotion should be by selection?—No, I would not lay down any hard-and-fast rules. Latitude is required, because we have so many special posts for which to recruit.

34,170. With regard to the training of specialists, you have indicated that it might be necessary to send them to overseas institutions to specialise in certain lines of work, but that there would be great advantage in training them in India, in plant breeding, for instance?—Yes. It depends what they are to be trained for. If you had a good staff at Pusa you could send them there.

34,171. In your own subject, chemistry, is it not possible to obtain the training you want in India?—I should prefer, as you mention a special subject, in the case of chemistry to send them Home.

34,172. On page 3, in answer to Question 1, you say that the production of better and heavier yielding varieties of crops is probably the most difficult and complicated problem facing agriculture in India to-day. I should think that it is one of the most important problems, but not the most complicated or difficult?—I think it is one of the most difficult problems.

34,173. Compared with the problem of improving cattle the difficulty is negligible?—I should put it equal to that. Have you studied the improvement of cotton?

34,174. I think I have?—That is one of the most complicated and difficult problems.

34,175. *Professor Ganqulee*: Is the improvement by selection or by hybridisation?—By hybridisation.

34,176. *Sir Thomas Middleton*: You mention plant breeding and crop improvement. Is the plant-breeding work complicated?—I think, unless we start with the fundamental work, we shall not go much further.

34,177. We have asked in the Questionnaire that we might be given a list of the problems now met with by scientific investigators in the course of their work which are being held over because of lack of resources. We have got from you the plant breeding and crop improvement problems; we have got no problem of a chemical nature?—The manufacture of synthetic nitrogen compounds.

34,178. Is that a problem for Indian Chemists?—It is a chemical problem.

34,179. Is it not now a commercial problem?—It certainly is a chemical problem because it deals with a change of matter.

34,180. I had in mind one answer which you gave in which you referred to the *usar* problem as being still unsolved; it is the only chemical one mentioned, apart from synthetic nitrogen; are you in a position to provide us with other problems?—Not on the spur of the moment.

34,181. *Sir Ganga Ram* asked you in very general terms about all your problems; I only ask you as a Chemist for your chemical problems?—Really, I was writing this note not as a Chemist, but as a Director of Agriculture in the United Provinces.

34,182. To come to a subject which you now have in hand, that is getting a suitable officer for your plant-breeding section, your idea is to get the best man you can and pay a good salary on a five years' agreement, and I think you stated in answer to previous questions, that you will have probably to look to America. In America there is the great advantage that there they have rice crops and other Indian crops. Now I do not quite know what you are going to do with this man in a five-year period. He could teach you methods?—At any rate, he would teach our young officers the methods; that is what I want at the moment.

34,183. And you feel pretty confident that if you were authorised to offer the salary you mention you would get a good man?—I cannot say that I do feel confident. The world is suffering from a dearth of competent men; but I think I stand a very great chance of getting him.

34,184. In the particular work which you have in view he would at best be able to deal with only a small part of the problem during the period?—But he would teach the methods to the young officers in this period.

34,185. What strikes me is this: You have got your young officers here who require to be taught methods; there is, I understand, a very experienced worker on rice in Bengal; why not send them there to learn methods for breeding rice?—But we want them for all crops besides rice.

34,186. Could you use a five-year man to deal with all these crops?—I take it then that your view is that a ten-year agreement is better or no short-term agreement at all?

34,187. I think that a ten-year period would be a great improvement on a five-year one, but an expert would be likely to come either for a short five-year period or on a permanent basis. I therefore make the suggestion

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that you might get training in methods within India?—We want him in the Province. Working here and there for short periods is no good. We want him to be in daily contact with us; that is the central idea of my scheme.

34,188. On page 6, Question 1, you mention a special research station for the investigation of the water requirements of crops. Has any scheme been drawn up yet or is it just a project?—It is a project.

34,189. Which would presumably be for one or two crops only, under all sorts of permutations in the conditions?—Yes.

34,190. With regard to Question 2, page 7, several references have already been made to your experimental school at Bulandshahr and I do not want to go into the question of cost; but it is obviously a case where you justify the cost in view of the results which the example of the pupils is likely to set in their own localities. You say that the average age of boys you take is 19 and that you would prefer them rather younger. I wonder whether boys going out from school at the age of 18 would be likely to be shining lights in their own localities. Do you not think that a longer course is required?—No, not for the moment. We have an alternative by which we might, later on, make it a four-year course; but I do not think it is required at the moment.

34,191. It occurred to me, in listening to the criticism, that you are spending something like Rs.1100 on what one might call five candle power light, and that a better policy might be to spend more per head in the hope of getting some lights of a hundred candle power?—I am convinced that it is meeting a need, because I have been criticised times without number in Council, last week was the latest date, for not opening more of these schools and they insisted on that. Now you see the criticism is that they are too expensive.

34,192. The Council cannot yet have any knowledge of the effects of the courses?—They have an excellent knowledge of their effects.

34,193. *Sir Henry Lawrence*: How long has this school been going?—For four years.

34,194. How many lads have been turned out?—Two batches.

34,195. Have they gone back to their fields?—Many have gone to their occupations, the occupations they would have gone to otherwise. Some of them have taken up rural industries and a variety of things.

34,196. They are mostly of the landowning class?—Yes, small landowners combined with various businesses.

34,197. *Sir Thomas Middleton*: In regard to Question 2, page 10, your institution at present combines instruction and research and I think you are aiming at a complete separation of the two?—We are willing to keep a research atmosphere in the teaching.

34,198. I think this sentence is rather severe: "This is at the best a make-shift arrangement and an administrative device for getting more work done than is paid for"?—I have worked in every capacity, as a Director and as a Research Officer, and I think I am perfectly justified in expressing that opinion.

34,199. I think you are a little hard on the administration. Do we not expect college teachers to do some investigation?—Some investigation. "Some investigation" is a different matter from economic investigations of the kind required there.

34,200. With regard to the question of providing work for the students of the college, you make the suggestion that in addition to training them to work on their own lands and for the Agricultural and Co-operative

Departments, a proportion of them should be recruited for the executive staff. Has any progress been made in that direction in the United Provinces?—Occasionally, I think, one or two get into the revenue staff.

34,201. There is no regular allotment of posts?—No.

34,202. Have you, in considering the question, decided upon the proportion of the total which, you think, could be absorbed?—It is difficult to say without proper examination; but I think it is only 5 or 6 per cent.

34,203. In discussing Question 2 on page 13 you say: "I advocate the development of Pusa as a purely teaching institute." Again the question arises in my mind, could you in teaching M.Sc. students entirely divorce research work from teaching work?—No. What I mean by a purely teaching institution is that teaching should be its principal activity.

34,204. Then you express in the following paragraph a very definite opinion, "The research activities of Pusa are bound to decline." Why do you think so?—Because the economic problems that require the presence of the officers can only be carried out in the Provinces. They could do fundamental work, but they could not undertake enormous economic researches.

34,205. You mean that if teaching were undertaken the research is bound to decline?—Yes. My idea in writing this was that it has now been realised that the problems must be tackled on the spot and not in isolated places like Pusa.

34,206. Then you are quite definite in the opinion (*See* page 17, Question 4), that "each Province should aim at becoming self-supporting in all branches of agricultural research." I do not quite understand what you mean by self-supporting?—That it should be able to attack all its major problems.

34,207. Have you framed any sort of estimate of the cost?—I could easily do so; it is not prohibitive. I should think the cost will be very little more than the cost if it is done in any other way. The problem has got to be tackled by somebody.

34,208. I am thinking of the cost of making each Province self-supporting, and of all problems arising in agricultural investigation. I may say that I have for the last ten or fifteen years been trying to assist in making England self-supporting from this point of view?—India is too large to run on the team principle like a small country like England.

34,209. That is exactly what I felt?—We would want many teams.

34,210. I can only say that expenditure at our rate would amount to something like Rs.26 lakhs a year?—That is not a large amount.

34,211. What is your total expenditure at present?—Rs.24 lakhs.

34,212. I think you misunderstand me. Rs.26 lakhs would be wanted purely for research work?—I think it would be easy to get it; it is not beyond our resources at all. I thought you were giving a figure of something like a crore of rupees. Rs.26 lakhs is a comparatively small sum. I do not know if it is under-estimated; it must be much more. Rs.26 lakhs is a flea bite in the provincial budget.

34,213. *Professor Gangulee*: What portion of the 24 lakhs is devoted to research work?—Rs.5 lakhs.

34,214. *Dr. Hyder*: Your total budget is Rs.25½ lakhs?—It is 24.4 lakhs.

34,215. And you are of opinion that you can get from the Council another 26 lakhs?—Not immediately, but in the course of a progressive programme of five or six or ten years.

34,216. That would be, in your considered opinion, a flea bite?—Yes, it would be a small sum, for agricultural development.

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34,217. *The Chairman*: It would be Rs.50 lakhs in all?—Yes. I have been attacked on the ground of not asking for enough, and not on the ground of asking for too much.

34,218. *Sir Thomas Middleton*: Then, your view is that when a Province finds itself confronted with a figure which it cannot face, the Government of India should come in and help?—Yes, if it sincerely desires any agricultural development.

34,219. The figure that I mentioned was purely for current expenditure?—Recurring expenditure; I do not consider that excessive.

34,220. You would have no difficulty in getting it?—I do not mean to say that there would be no difficulty; I should think it is possible.

34,221. In your answer to Question 11, on page 24, there is a small mistake which I want to be corrected. You say: "In England the Government charge 35 shillings per cwt. for Yeoman II wheat." Government does not sell the seed there?—I can give you the place where that was taken from; it was taken from the "Times" three weeks ago.

34,222. The National Institute of Agricultural Botany does that work?—Do they sell it for that price?

34,223. I have forgotten the rate.

34,224. On the question of statistics, you are responsible for the preparation of crop forecasts. Who supplies the statistics that are published by the Government of India? Is it your department?—No. We supply the agricultural statistics only.

34,225. Do you publish statistics separately?—We have a number of publications.

34,226. In much the same form as the Government of India's summary?—It is all laid down by rule.

34,227. But the Government of India publishes abstracts only for the Provinces, yours will give details district by district?—Yes, ours is in more detail.

34,228. You mentioned that there was phosphate deficiency in all Indian soils?—That is so far as my experience goes.

34,229. The soils of the North-West?—In the Doab they are so.

34,230. You mentioned that there was an abundance of lime and potash in all your area?—As a matter of fact, I did not mention it.

34,231. In reply to Sir Ganga Ram?—It is based on an analytical basis.

34,232. Would that statement apply to the tract south of the Jumna, which is alluvium derived from Central India?—If you are referring to the black cotton soil tract, I cannot say without reference to the records.

34,233. I thought your answer referred to the Himalayan alluvium?—It referred to the sub-montane and Doab tracts.

34,234. *Dr. Hyder*: In reply to Question 1, on page 1, you say: "No power of certification exists." Is this statement based on a study of the Government of India Act?—I noticed that when I was correcting the proof. It should be "No power of certification is likely to be exercised." That is how the statement should read.

34,235. How many districts have you got in your charge?—As far as I can remember, 48.

34,236. You have got six circles?—Yes.

34,237. You have got demonstration farms, and you have got what are called demonstration plots. Do you, as the Director of Agriculture, know in how many districts you have these demonstration farms and small

demonstration plots?—We have demonstration farms and experimental farms.

34,238. But the experimental farms are located at the headquarters of each circle. In which of the districts are the demonstration farms located?—They are situated in Aligarh, Agra, Muttra, Bulandshahr, Bareilly, Naini Tal, Cawnpore, Mainpuri, Etah, Hardoi, Sultanpur, Fyzabad, Benares, and Lucknow.

34,239. Are there any districts which are without these demonstration farms?—Of course. The rest of the districts are without them.

34,240. Do you think there is room for expansion in this direction?—I think there is room for some more experimental and demonstration farms.

34,241. Would you lay emphasis on the small demonstration plots or on the demonstration farms?—I prefer the demonstration farms.

34,242. Are the demonstrations which you carry out on the ryots' holdings included in this?—No, they are not included in it.

34,243. That is over and above these?—Yes.

34,244. Is the Bundelkhand Division well supplied in this matter?—We are making a demand for a grant for an experimental farm in Jhansi this year, so I understand.

34,245. It is a very insecure tract from the point of view of rainfall?—Yes.

34,246. And the greatest need is in Bundelkhand?—There is very great need, but it is not the greatest need.

34,247. How does it compare with other tracts which have demonstration farms?—It is a precarious tract; I should not say that it constitutes the greatest need.

34,248. I understand you are not very much interested in propaganda by means of the printed word?—Not so much.

34,249. But all the same you issue a journal. What is its circulation? 1,000?—Yes, that is the approximate figure. I have had the figure worked out, but I cannot carry it in my head; it is something like that.

34,250. Would you agree with a statement which I am quoting from the Pioneer that a very high official of the Government told the writer that we have not yet reached even 1 per cent. of the rural population, and that we are merely scratching the surface? Do you think that represents accurately the facts?—The percentage of the population reached by means of the journal?

34,251. By all means, the printed word, the demonstrations which you carry out, and everything else?—I have not formed an estimate, but I think it is not more than 5 per cent.

34,252. You are interested in sugarcane?—Yes.

34,253. And Shahjanpur 48 is your particular variety?—Yes, it is known to the cultivators as Java.

34,254. You have got some areas in the United Provinces under Coimbatore 213?—Yes.

34,255. There is a statement in the Report on Agriculture in the United Provinces that the essentials as regards cane are high yields and quick maturity. Does your particular variety, Shahjanpur 48, satisfy these two conditions?—Yes.

34,256. What about Coimbatore 213?—It does not satisfy the condition of early maturing.

34,257. Are there large areas under Coimbatore 213?—I have not got correct statistics.

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34,258. I understand there are only two districts in the United Provinces which can grow jute?—Yes, Kheri and Sitapur.

34,259. You cannot extend the area?—It may be possible to extend it into Bahraich.

34,260. At present you have only about 2,000 acres?—I think it is more; it is perhaps 5,000 this year.

34,261. It has increased?—Yes.

34,262. Do you think more areas might be brought under jute?—Yes, I think they might be.

34,263. You are not prepared to answer any questions on fodder, are you?—No, I am not.

34,264. That does not concern you?—No.

34,265. Do you know whether any experiments have been made with regard to the introduction of new grasses, either local or foreign?—A certain number of experiments will be found described in the annual administration reports; I will read them out to you if you like.

34,266. No, I was asking you your opinion as regards extension?—I prefer to give a complete answer, please. Experiments have been carried out with sann flower, sweet *juar*, a special kind of bamboo and *sakalin*, which have given very promising results.

34,267. You have been carrying out an experiment on wheat under your department at Hardoi, have you not?—Yes.

34,268. From that experiment you found that Pusa 12 gives the best results when it is given nitrate of soda?—I have not seen the details of the experiment and I cannot speak from personal knowledge; it is not under my personal control; it is under the Deputy Director of the Central Circle. Full information on that point can be given to the Commission when it visits Hardoi.

34,269. Do you, as a Chemist, know whether the soils of the United Provinces are deficient in this particular chemical, nitrate of soda?—I know they are deficient in nitrogen.

34,270. You have found that out?—Yes, I found that out, and many other people have found it out too; it is common knowledge.

34,271. Have you formed any idea as regards the amount of money that you would require during the next ten years for the purpose of development?—No, I have not.

34,272. So you have got no programme?—We have a programme but we have not worked it out in sufficient detail to state the exact cost.

34,273. *Raja Sir Rampa! Singh*: Do you keep any record of the diploma holders leaving your college?—Yes, we keep a record, and the subsequent careers of most of the students are known.

34,274. What percentage, do you think, have joined services other than the Agricultural?—In order to give an answer to that question I should have to get the exact statistics.

34,275. What is the status of your diploma holders compared with that of the B.Sc.?—They are of equal status.

34,276. Are they treated as equal?—They are treated as holding the equivalent of a degree in science for all posts in Government service.

34,277. How many districts comprise one agricultural circle under a Deputy Director?—They vary somewhat, but I should think about six. The Province of Oudh is under one Deputy Director.

34,278. Do you not think the circle is too large?—Yes, undoubtedly.

34,279. What staff do you station in districts?—There is the Deputy Director; under him is a Divisional Superintendent, a member of the United Provinces Service, who may have three districts or possibly four under his control, sometimes two. Under them are members of the Subordinate Agricultural Service of various grades who are doing different work in different Provinces, mainly the management of seed distribution and demonstration: that is their main work, and the management of farms.

34,280. Do you think the staff is sufficient?—No. We are, as you know, aiming at a steady increase in the staff. I am not in a position to tell you what the budget proposals are, but our programme is for a steady increase in staff.

34,281. You have stated that gradually cultivators are adopting improved methods in certain localities?—Yes.

34,282. What improved implements have been adopted?—During the last year the main bulk of the implements have been ploughs; nearly 3,000 ploughs were distributed, Watts ploughs and Meston ploughs. Out of 9,000 one-third of the implements were ploughs.

34,283. Are there any special arrangements for the repair of these implements and the replacement of parts?—The simpler kind of ploughs can be quite easily repaired by the local *mistri*; every Government farm and every seed store stocks spares.

34,284. Is it not a fact that the village blacksmiths and carpenters cannot repair these implements?—They cannot repair the more complicated kinds of plough, but the simple Meston plough they can repair themselves and almost make.

34,285. I doubt it very much; my personal experience is that they have to give up the use of these implements simply because they cannot be repaired by the village blacksmiths. Is it a fact that the cultivators have to go a long distance to get these implements?—Unfortunately that is true; distances are great in this country.

34,286. Would it be useful to have some small training school or workshop where blacksmiths and carpenters could be trained?—That is a very good suggestion.

34,287. You have stated that landlords have started to do a great deal of farming within the last two years. Is that owing to improved methods of cultivation or high prices?—I attribute it to the profits obtained by better methods of farming. I think it is entirely due to better methods of cultivation. It may be assigned to a variety of causes; it might be assigned to the desire of the landlords to get hold of as much *sir* land under the new Act as they can, but I do not think it is due to that; I think it is due to a desire to benefit their tenants and to get hold of the profits occasioned by better cultivation.

34,288. There is a great demand for the distribution of seed; do you think that is because of the improvement of seed, or is it on account of *khaskhars* being poor and the rate that you charge being easier than that charged ordinarily?—I am satisfied that it is partly because of the good terms we give the *khaskhars*; that is undoubtedly one factor; we give them very fair terms. The charge is made in the most scrupulously careful manner; I think that is a contributory cause; but I should say the main cause is the increased yield obtained from the better seed.

34,289. Have they begun to appreciate that?—Yes, I think so, undoubtedly.

34,290. *Sir Ganga Ram*: You say in this Report* that you submitted some time ago a scheme for fixation of nitrogen by electricity?—I did not submit the scheme; a scheme was submitted by some technical officer to the Government of India.

* Report on Agriculture in the United Provinces (not printed).

34,291. What became of that scheme?—I cannot tell you; it is probably there now.

34,292. Have you got a copy of it?—Yes, but it is confidential; I am afraid I cannot give it to you; I cannot circulate it without the sanction of Government.

34,293. *Sir Thomas Middleton*: The present expenditure on agriculture is about 25 lakhs?—Yes, 24.4 lakhs.

34,294. What proportion of that expenditure is at present given to research?—About 5 lakhs. I can give you the exact figure if you like.

34,295. The rest goes on organisation and demonstration?—Yes.

34,296. In developing your department, would you agree that your demonstration and external work is more in need of assistance than research work, or would you first endeavour to develop research?—At the moment, as I have already stated, the first thing I should do would be to try and develop a very strong section on crop improvement.

34,297. You referred to the fact that you had a programme, but you said you had not gone into the financial details of it?—Yes. You will find a full discussion on the matter in the proceedings of the Legislative Council.

34,298. Did that programme contemplate a large development in your field work?—Yes; but as I have said, I regard the development of a section on crop improvement as being the most important thing at the moment.

34,299. In view of the fact that the total expenditure on agriculture is 25 lakhs, while the total expenditure on education in the Province is 170 lakhs, you think there will be no difficulty in getting about 26 lakhs for research?—I cannot say there will be no difficulty, but I should think it is within the bounds of possibility. I should think it is very possible.

34,300. That means that the total expenditure of your department would rise to about a crore?—About 50 lakhs.

34,301. You would not spend half your resources on research?—It would come to 52 lakhs.

34,302. That assumes no extension of your present outside activities?—Put the extension at about 5 lakhs a year; that is about all we should do.

34,303. I think a scheme constructed on those lines would be criticised?—I do not know how accurate your figures are with regard to the 26 lakhs. I cannot discuss it in detail. You tell me it is 26 lakhs; I should have thought that was rather on the small side.

34,304. *Mr. Calvert*: You say you could spend 26 lakhs on research?—No. You say my scheme would cost for every Province in India 26 lakhs. I say, if that is so, I consider it possible that this sum could be obtained. That is the position. I do not know whether your figures are correct.

34,305. My estimate was not based on the requirements of India in all agricultural matters. My figure is the annual grant to the research institute?—I have seen it; 26 lakhs seems to be a very small sum.

34,306. I doubt whether you quite realise the work which that covers. It does not cover any educational work at all, no demonstration. The total expenditure is about three times that?—Twenty-six lakhs is not the sort of figure that is going to put India on its back. I should not say the figures which you have quoted would rule any scheme out of action as a financial impossibility; far from it.

34,307. There is something wrong in that calculation. Now is this high seed rate for wheat due to poor tillering?—It has never struck me that it is exceptionally high. What is the rate in England? It is about that?

34,308. I am talking of your adjoining Province of the Punjab?—It has never struck me as unusual.

34,309. Have you any suggestions to make to lighten your duties as a Director?—Many.

34,310. Would you like to put them forward?—I do not think it would be the least good to do so.

(The witness withdrew.)

The Commission then adjourned till 10 a.m. on Tuesday, the 1st February, 1927.

APPENDIX I.

(QUESTION 33,917.)

GOVERNMENT OF THE UNITED PROVINCES, REVENUE DEPARTMENT.

Resolution No. 298/1—241 of 1919, dated 7th February, 1919.

Read:—

G.G.O. (Revenue and Agriculture) No. 903-88, dated the 18th September, 1918.

Read also:—

Letter No. 42/V-841-A, dated the 9th October, 1918, from the Director of Land Records and Agriculture, United Provinces.

Observations.—In a recent resolution on the annual report of the Department of Agriculture His Honour, the Lieut.-Governor, expressed the opinion that the time had arrived for the constitution of a Provincial Board of Agriculture which would meet regularly and advise on policy and administration. His Honour has decided that a Board of Agriculture should be established with effect from the 1st of April, 1919. The constitution will be as below:—

The Board shall consist of fourteen members, viz.:—

- (1) The Director of Agriculture—Chairman *ex-officio*.
- (2) One member to be elected by the Upper India Chamber of Commerce.
- (3) One member to be elected by the United Provinces Chamber of Commerce.
- (4) One member to be elected by the British Indian Association, Oudh.
- (5) One member to be elected by the United Provinces Zamindars' Association.
- (6) and (7) Two members to be appointed from amongst non-officials by the Local Government.
- (8) Chief Engineer, Irrigation branch.
- (9) Registrar, Co-operative Societies.
- (10) Chief Conservator of Forests.
- (11) Principal of the Agricultural College.
- (12) and (13) Two officers of the Agricultural department nominated by the Local Government.
- (14) Deputy Director of Land Records.

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2. The Board will have power to appoint committees for particular objects and to co-opt for the purposes of these committees not more than two officials and two non-officials from among other than members of the Board.

3. The nominated and elected members will hold office for three years and will be eligible for re-nomination or re-election, as the case may be.

4. The duties of the Board will be mainly advisory. Its functions will be to act as adviser of the Government and the Director of Agriculture with regard to such matters as may be referred to it by the Government or by the Director for an expression of its opinion, but it may also advise in relation to any other matter which, with the permission of the chairman, may be brought before it by any member. The Governing Body of the Cawnpore Agricultural College will continue to be the adviser of the Local Government with regard to the affairs of that college. The Local Government will, every year, place at the disposal of the Board, a sum which the Board will be able to utilise for any suitable purposes, including non-recruiting grants to private persons or farms with the object of the general agricultural improvement of the province.

5. The Board will meet on such dates and at such places as the chairman may decide. A meeting should be ordinarily held once a quarter. Papers may, if the chairman considers fit, be circulated among the members of the Board.

6. Members of the Board shall draw travelling and halting allowances as laid for officers of the first class.

7. In the event of a difference of opinion among the members present at a meeting the opinion of the majority shall be held to be the opinion of the Board, and if the voting on any question be equal the chairman shall have a casting vote.

8. Any member can record a minute of dissent and the same shall, if the member so requires, be recorded in the minutes of the proceedings.

9. The Personal Assistant to the Director of Agriculture shall be ex-officio the secretary of the Board. The duties of the secretary shall be:—

(1) To prepare the agenda of the Board's meeting and to circulate the same among the members at least ten days prior to each meeting.

(2) To lay before the Board all matters for discussion.

(3) To conduct the correspondence of the Board and

(4) To prepare, keep, and circulate among members the minutes of the proceedings of the Board.

10. Sir Harcourt Butler attaches great importance to the association of non-officials and officials in this most important matter and will always be glad to receive proposals which will make the Board more efficient. He thinks that the above outlined constitution will be a good beginning for practical work.

APPENDIX II.

Statement showing rates per maund of octroi or terminal tax on the principal varieties of grain, raw sugar and cotton in typical markets in U.P.

Name of municipality.	Wheat.	Gram.	Barley.	Rice.		Pulses.	Juar, Bajra, etc	Oilseeds.	Raw sugar.	Cotton.
				Unhusked.	Husked.					
	R. A. P.	R. A. P.	R. A. P.	R. A. P.	R. A. P.	R. A. P.	R. A. P.	R. A. P.	R. A. P.	R. A. P.
Cawnpore (Terminal) ...	0 0 6	0 0 6	0 0 6	0 0 3	0 0 6	0 0 6	0 0 6	0 0 9	0 1 6	0 0 9
Lucknow (Octroi) ...	0 1 0	0 0 6	0 0 6	0 1 0	0 1 6	0 0 6	0 0 6	0 1 3	0 4 6	1 9 0%
Gorakhpur (Octroi) ...	0 1 6	0 1 0	0 1 0	0 1 0	0 1 6	0 1 0	0 1 0	—	0 4 0	—
Saharanpur (Terminal) ...	0 0 6	0 0 6	0 0 6	0 0 6	0 0 6	0 0 6	0 0 6	0 0 6	0 0 6	0 0 6
Meerut (Octroi) ...	0 1 0	0 0 9	0 0 9	0 1 0	0 1 6	0 1 0	0 0 6	0 1 0	0 2 0	—
Aligarh (Octroi) ...	0 0 6	0 0 6	0 0 6	0 0 9	0 1 0	0 0 6	0 0 6	0 0 3	0 1 6	0 0 2
Hathras (Terminal) ...	0 0 3	0 0 3	0 0 3	0 0 3	0 0 3	0 0 3	0 0 3	0 0 3	0 0 6	0 0 3
Muzaffarnagar (Terminal) ...	0 0 6	0 0 6	0 0 6	0 0 6	0 0 6	0 0 6	0 0 6	—	0 9 9	—
Ghaziabad ...	...	...	...	There is no octroi or terminal tax in force.						
Bareilly (Octroi) ...	0 2 0	0 0 9	0 0 9	0 1 0	0 2 0	0 1 0	0 0 9	0 0 9	—	—
Sitapur ...	...	...	...	There is no octroi or terminal tax in force.						
Allahabad (Octroi) ...	0 1 3	0 0 6	0 0 6	0 1 0	0 1 9	0 0 6	0 0 3	—	0 0 6	—

Rates shown are per maund.

Note.—Octroi duty on goods imported into a municipality is returned if the same is exported out of it, but a terminal tax is not so returned.

Tuesday, February 1st, 1927.

LUCKNOW.

PRESENT :

THE MARQUESS OF LINLITHGOW, D.L. (*Chairman*).

Sir HENRY STAVELBY LAWRENCE, K.C.S.I., I.C.S.	Sir JAMES MACKENNA, Kt., C.I.E., I.C.S.
Sir THOMAS MIDDLETON, K.B.E., C.B.	MR. H. CALVERT, C.I.E., I.C.S. Professor N. GANGULEE.
Rai Bahadur Sir GANGA RAM, Kt., C.I.E., M.V.O.	Dr. L. K. HYDER. Mr. B. S. KAMAT.

Mr. A. W. PIM, C.S.I., C.I.E., I.C.S. } (*Co-opted Members*).
Raja Sir RAMPAL SINGH

Mr. J. A. MADAN, I.C.S. } (*Joint Secretaries*).
Mr. F. W. H. SMITH

Dr. A. E. PARR, Ph.D., Deputy Director of Agriculture,
Western Circle, United Provinces.

Replies to the Questionnaire.

QUESTION 1.—RESEARCH.—The budget of the Agricultural Department of the United Provinces for the year 1926-27 is 24.5 lakhs of rupees. The cultivated area is 35 million acres. The Province thus spends approximately 1 anna per cultivated acre on its Agricultural Department. Thirty-five million people, or roughly 75 per cent. of the total population, are directly dependent upon agriculture for their living. The total budget of the Province for the year 1926-27 was Rs.15,06,95,034.

No more need be said to show the extraordinary small amount of provincial revenue which is spent on the actual improvement of the staple industry of the Province. More men and money are needed in order to expand the Agricultural Department to enable it to cope to an appreciable extent with the task before it. At present it occupies a position of secondary importance in the eyes of Government as the pay of its Director clearly shows when compared with that of other Heads of Departments. The present research staff is very limited and it can tackle only a few of the very large number of problems awaiting solution. For example, selection and plant breeding work has given excellent results on some crops, but up to date it has been possible to study merely a few of the staple crops of the Province. In almost every branch of agricultural activity the problems awaiting solution are large in number. As the public awakens to the possibilities of agricultural improvements there will, no doubt, be a demand in the Legislative Council for the expenditure of much more money on the Agricultural Department.

QUESTION 3.—DEMONSTRATION AND PROPAGANDA.—Demonstration and propaganda work is carried on by staff distributed in various districts of the Province. The following are the main lines of work at present:—

(1) seed distribution, (2) introduction of improved implements and demonstration of improved methods of cultivation, (3) the organisation of private farms, (4) tube-well installation and improvement of existing wells, (5) demonstration farms run on commercial lines.

The supply of pure seed which has been well stored is a leading feature of departmental activities and there is a regular public demand for further development of this work. Seed distribution is carried on by a series of farms and seed stores scattered throughout the Province. A large organisation has been built up and Government have made arrangements for financing extensive operations. Considerable areas of the departmental farms are devoted to growing selected varieties. This pure seed is used to stock and restock a large number of private farms which are supervised to some extent by the Department. In this way a large quantity of pure seed is available for distribution annually. There are now 127 dépôts in existence and 105,052 maunds of seed were sent out last year. As a result of this work, many lakhs of acres of improved varieties of crops are now being grown in the Province. These seed dépôts are also used as centres for supply of improved implements and manures.

Actual demonstration has brought several lakhs of acres under the influence of the Department within the last few years. The method of demonstration varies widely in character in different parts of the Province. In Gorakhpur, for example, the development of large estates with big areas of home land is the best way of influencing the cultivator. In another tract a promising method on the *batai* or share-of-produce system is being carried on; cultivators lend a portion of their land, cultivation methods recommended by the Department are followed, expenses are shared and profits divided after disposal of the produce. In the Rohilkhand Division, improved methods of growing sugarcane are demonstrated by hiring small areas of land for a short period, cultivation is carried out by officials of the Department who live on the spot. The cultivation of small areas of land under strict departmental control is an effective method of introducing and establishing improvements in new areas. The landowners and tenants can observe the value of new methods for themselves; they can examine the details of the cultivation at every stage and can suggest modifications which will enable them to cultivate similarly with the means at their disposal. The areas commanded by tube-well irrigation afford an excellent opportunity for this type of demonstration; tube-wells and pumping plants cannot be used to full advantage unless some form of intensive cultivation is adopted. The established practice of the Department is to start the demonstration of some form of intensive cultivation when a tube-well has been completed. Under a scheme recently sanctioned, owners are granted part of the cost of new installations in places where the Department requires facilities for demonstration or seed production, if they undertake to lease small areas of land to Government for a term of years and to supply water at fixed times and rates. The scheme provides the Department with land to cultivate for a period sufficient to establish new methods and varieties of crops without the heavy initial expenditure of a demonstration farm. In general, it may be stated that in the United Provinces demonstration must be carried out in the early stages, on the cultivator's own fields. To win his confidence an actual practical demonstration of the crop, implement, or improved method is necessary under his own conditions. He is disinclined to accept the spoken or the written word as worthy of trust when it concerns agricultural improvements. Successful practical demonstration on the spot is needed first of all to win his confidence; later on, simple improvements can be introduced by the spoken word of a practical man who has already shown his capacity to the villagers concerned. I, therefore, consider that demonstration and propaganda work can be looked upon as having two phases. First of all the suspicious peasant requires ocular demonstration of the particular improvement, no matter how simple, on his own fields. Later on, after he has become confident in his own local agricultural officers we may expect that he will come to the Department for advice instead of the Department having to go to him. Gradually, it will be possible to deal with

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organised bodies in the form of agricultural associations and in this way in the course of time most of the demonstration work of the simpler improvements will be done by the people themselves. More complicated improvements will, of course, necessitate localised or centralised instruction. In the United Provinces in many districts the time has now arrived for the organisation of these local agricultural societies. Farms which have been running for several years and particularly those which during the last few years have been making satisfactory profits have become known to large areas of the districts in which they are situated, and they are the centres of pilgrimage for large numbers of agriculturists from considerable distances. I look forward to the time when every farmer, either individually or through his local agricultural organisation, will think it well worth while to keep in touch with his district farm.

QUESTION 4.—ADMINISTRATION.—I think the Government of India can best assist the Provinces in the development of their agriculture by providing men and money for research on important local problems which have not yet been tackled. The procedure followed by the Indian Central Cotton Committee seems to me an excellent one and could, I think, be copied by the Government of India with advantage; schemes for research work are sent up to the Cotton Committee and, if they are approved, the committee, so far as funds permit, give financial help; the work is then carried out under the supervision of the provincial department. The great advantage of this arrangement is that it gives facilities for investigating a definite problem where that problem is of real practical importance. A scientific sub-committee examines the schemes sent up from the Provinces and thus ensures co-ordination and prevents overlapping. A piece of work designed first of all to attack a problem peculiar to one Province may develop in such a way that it becomes of interest and importance to several Provinces or even perhaps to the whole of India.

QUESTION 7.—FRAGMENTATION OF HOLDINGS.—The loss in agricultural efficiency in the United Provinces due to sub-divided and scattered holdings is very great; but, as many writers have pointed out, fragmentation is not an unmixed evil. Its chief merit is that by giving the cultivator a variety of soils and conditions it enables him to grow different types of crops and thus to gain somewhat in security against the vagaries of climate.

The chief obstacles in the way of consolidation are—

- (1) the difficulty of reconciling the many interests involved;
- (2) a lack of knowledge and, therefore, a lack of the appreciation of the advantages which consolidation would confer.

A special effort is required to consolidate the holdings in a few typical villages in each district to serve as examples. Consolidation has gone on in the Punjab to a considerable extent. In the first instance persuasion by experienced officers was the prime-mover, I understand; but later the people themselves took up the work with spirit. In the United Provinces our difficulties are perhaps greater; our progress has certainly been slower, and it appears that special inducements will have to be offered to produce quick results in a few cases required for demonstration. I think it would be worth while for the Government to promise remission of revenue to be followed by remission of rent as an inducement to a few typical villages to consolidate. Since division of irrigation rights is likely to be a stumbling-block in many cases, special concessions for building wells in dry fields might be offered, such as *taccavi* free of interest and free service of the Agricultural Department's well-borers.

QUESTION 8.—IRRIGATION.—The United Provinces are fortunate in having extensive irrigation systems. About 11 million acres or over 30 per cent. of the total cultivated area can be irrigated, whilst in some districts as much

as 80 per cent. of the total *rabi* area is watered. Of the total area irrigated about 3 million acres are watered from canals, 6 million from wells and the remainder from a variety of other sources. Canals now under construction will add $1\frac{1}{2}$ to 2 millions acres to the above figures. When these canals are completed the supplies from the provincial rivers will be almost exhausted and little further extension from these sources will be possible. Similarly, the area irrigated from tanks and ponds is not likely to increase in the future since many of these depressions are being drained. The only remaining source of supply is the sub-soil water. Experts have estimated that not less than 12 inches of the total annual rainfall of the Province sink down to swell the water underground. Of the remainder a large part is lost in evaporation and the balance goes as a surface run-off to the rivers. Sub-soil water flows approximately at a rate of one mile a year, whereas river water disappears at not less than a mile an hour. Thus the water that reaches the rivers by underground drainage remains within our boundaries and is available for irrigation in one district or another for a long period, whereas that going direct to the rivers is beyond our reach in a very few hours. Taking the figures given above, we see that the sub-soil water is replenished each year to the extent of 12 inches. There are thus theoretically 12 inches of water under each acre of the Province available each year for irrigation without lowering the water level. Nine inches of irrigation are sufficient after a normal monsoon to grow a crop of wheat. Since little more than 50 per cent. of the total area of the Province is cultivated, even allowing a very large margin for loss, the water added to the sub-soil each year should be sufficient to mature a crop of wheat on every cultivated acre. The area irrigated from wells, as from other sources, varies considerably from year to year. In years of short rainfall there is a great increase; this indicates that in normal years much more water could be taken from the sub-soil than is usually done, without seriously lowering the water level. With large areas asking for irrigation, it is reasonable to inquire why well construction has not developed to a still greater extent. The answer is not a simple one: difficulties and cost of construction, land tenure, return from money invested, and power available for lifting water, are all limiting factors. Lack of water is not the cause. It may safely be stated that there is room for considerable extension of well irrigation in all tracts where well construction is reasonably possible. Improvements which the Agricultural Department is able to introduce make well construction in some tracts an entirely different question to-day from what it was a few years ago, and the whole problem requires reviewing from this aspect of more intensive production. Immoderate water-lifting from one area will no doubt reduce the level of sub-soil water and in some cases, particularly in dry years, put wells already constructed out of action, but this is one of the problems to be faced. Wells of this nature must be gradually replaced by others drawing on deeper layers for their water.

Some of the districts of the *doab* in which canal irrigation is common have also excellent supplies of underground water at moderate depths. Muzaffarnagar and Meerut are examples. If special inducements were offered for building wells in these districts, more canal water might be set free for use in the dry parts of Agra and Muttra, where deep wells and brackish often make even irrigated cultivation difficult. Decrease of revenue, owing to loss of water by the way, could be made up by an increased general or local charge. An additional indirect advantage to the tract concerned would be the rise in the water level which usually accompanies canal irrigation; wells which were formerly too deep to be of much use would thus become of greater practical value.

The fuller exploitation of the underground water supplies is, in my opinion, the most urgent need of the agriculture of the Province. Several

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millions of dry acres are thirsting for the irrigation water present in abundance in the sub-soil at, in many cases, moderate depths. The necessary experience in well-making has now been gained and the time has arrived for a much bolder forward policy. Certain lines of advance are clear; the zamindar with a large farm will have his own power installation; for the cultivator with only two or three acres a central supply giving water to several holdings grouped as economically as possible seems the best arrangement; and for the man who occupies a midway position a *pucca* well worked by bullocks is perhaps the best scheme at present. If all combined for a big effort the area commanded by well irrigation could in my opinion be increased by one million acres in the next ten years and probably by double that amount in the following decade.

QUESTION 10.—FERTILISERS.—(a) During the last few years, much of my time has been occupied in running demonstration farms on commercial lines and in making them financially successful. The first essential for success has usually been found to be an adequate and secure supply of water. Where this has been obtained sufficient manure has always been the next requirement. Much experimental work has been carried out in order to discover the most economical source of fertilising material; mineral manures and organic manures have been fully tested. The general conclusion I have arrived at is that for the immediate future organic material supplied as green manure must form the basis of manuring in the west of the Province. Of the green manures tried *sanai* has so far proved the most successful. A large number of demonstrations have been carried out in the villages, and the results so far obtained clearly show that large areas of the United Provinces can profitably be manured by ploughing in green crops. Where the holdings are very small, the practice is not likely to find favour because the cultivator requires each year the whole of his area to support his family and cannot in his present financial position afford to forego an immediate small advantage for a larger one in the future. At the same time, the area under larger holdings is considerable and there is no doubt that the larger type of cultivator can profitably devote some of his fields to growing crops for green manure. Men farming on intensive lines are beginning to follow this practice. Before intensive agriculture can be taken up, a secure supply of water is essential; some of this water will be used up in growing green crops for manure. Where water is at all deficient, cultivators are reluctant to use it in growing crops for which they get no immediate financial return. Green manuring is, in fact, a way of establishing the balance between water and nitrogen where the supply of the former has outrun that of the latter. Where water is available in only small quantities in proportion to the amount of land under cultivation, the natural recuperative power of the soil supplies sufficient nitrogen to make the soil capable of making full use of the water available, but where, either from canals or wells, a liberal water supply has been arranged for, more manure is essential if full use is to be made of the irrigation facilities.

(b) Artificial fertilisers are at present of little importance in the agriculture of the United Provinces; until quite recently they were almost unknown to the ordinary farmer. It seems, therefore, premature to think of measures for preventing fraudulent adulteration.

(c) In order to popularise new and improved fertilisers, those methods of demonstration will be required which have been successful in introducing other agricultural improvements.

(d) Intensive manuring is at present followed in the neighbourhood of large towns where city refuse is available in large quantities for market gardening purposes. In recent years there has been a big demand for oil cakes and other manures from certain tracts where potato growing has developed on a large scale. Recent improvements in sugar cane

varieties and their cultivation are now having the effect of stimulating a demand for more manure for the sugar cane crop. In general, it may be stated that the possibilities of more intensive agriculture in the United Provinces are now beginning to be realised and no question is of more importance and none is occupying the thoughts of the progressive cultivators more than the manurial problem. The near future will see an increasing demand for all kinds of nitrogenous manures.

(e) As has already been pointed out, general interest in artificial fertilisers has only recently been awakened. Much more investigation is required before the full effect of the various manures can be specified for the various soils and crops. Local trials combined with scientific study on experimental farms and in laboratories will gradually elucidate the problems as they are met with.

QUESTION 11.—CROPS.—Most of the crops of the Province are capable of considerable improvement, if the ordinary methods of the Economic Botanist are applied to them. Selection and plant breeding have already given excellent results with wheat, cotton, and sugar cane—the crops to which most attention has so far been devoted—and similar effort given to other staple crops, such as *juar*, *bajra*, barley, &c., would no doubt yield equally satisfactory progress. Improved cotton, wheat, and sugar cane has spread widely and rapidly over large areas of the Province and have given great financial benefits to the growers.

In answering Question 3, I have mentioned the extensive seed distribution organisation developed by the Agricultural Department. The work thus carried on is very valuable, but it absorbs much of the time of the staff. The maximum efforts of the department have only a gradual effect on the Province as a whole. Commercial agencies are required to take up the work of seed supply as is done in other countries. This would enable an improved variety to spread over the area suitable for it much more quickly than at present. Incidentally, it would relieve the staff of the department for other work.

QUESTION 12.—CULTIVATION.—Where canal or well water permits an intensive system of cropping, cultivators in many cases have been slow to realise that the change from the general custom of shallow ploughing would be an advantage. Experiments have shown much better crops can be obtained by gradual increase in the depth of the soil under cultivation than by shallow ploughing. The Sarda Canal will bring under irrigation large areas of land which previously depended upon natural moisture; this tract will offer a good opportunity for immediate introduction of deeper cultivation. Improvements already worked out at Shahjahanpur are available for introduction on a wide scale as soon as the necessary irrigation becomes available.

Much of the land intended for *kharij crops* receives very little cultivation before the seed is sown; little ploughing is done in the hot months of May and June except for the purpose of immediate sowing. As a result, the first rain at the beginning of the monsoon falls on a hard surface. If the fall is a heavy one, much of the water runs off the ground and quickly flows to the rivers; valuable moisture is lost and fertilising material and fine soil are washed from the field. It is of the greatest importance that this early rain should find its way into the ground on which it falls. This is especially important in districts of low rainfall where sowing is frequently delayed owing to the first falls of rain being light. If the surface were in a broken condition, sowing would be possible after a shower of rain which otherwise would scarcely penetrate the soil. Means for making ploughing before the rains possible and popular would be of great value to many of the districts of the Province.

QUESTION 14.—IMPLEMENTS.—Since 1914 there has been a marked rise in the wages of labour; there is also a definite shortage of working men

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at busy seasons in some districts. As a consequence, a pronounced demand for machinery is arising in cases where the size of the holdings and the system of farming make paid labour necessary. The following are the most important requirements:—

- (1) better ploughs, in order to reduce the labour involved in preparing a seed bed;
- (2) extra power, such as oil engines for lifting water where the wells give a big discharge;
- (3) threshing machinery, to set free man and animal power at the time when sugar cane, cotton, and other crops require attention, in the months of May and June;
- (4) power-driven machinery for crushing cane;
- (5) harrows, for cultivation in young growing crops such as sugar cane and wheat;
- (6) machinery suitable for lifting water where the discharge is not sufficient to employ an oil engine economically.

To meet the above needs, much experimental work has been done and many useful implements are now on the market; but many problems still remain to be tackled.

There is no difficulty in procuring firms to manufacture implements and machines for which there is a demand, but the necessary private agencies for the distribution of the various things have not yet been developed. Lack of commercial agencies has made it necessary for the Agricultural Department to carry on almost the whole retail trade in agricultural implements. Attempts have at different times been made by various firms to establish local agencies, but so far such agencies have usually proved of little value and have disappeared after a few years, as the amount of trade done has not been sufficient to support them. As the demand increases, this difficulty will no doubt be overcome. By encouraging the local manufacture of the simpler implements such as small ploughs a certain amount of progress can be made. Local manufactures are better able to arrange for inexpensive local distribution. Firms at a distance must realise that it is not sufficient merely to sell an implement or machine; an efficient spare part service is essential and also an organisation for keeping the machines in good working order in the villages in the early days of their introduction.

QUESTION 24.—ATTRACTING CAPITAL.—In order to induce men of capital and enterprise to take to agriculture it is first of all necessary to assure them that they can make a fair living by their undertaking. A landowner needs to be convinced that he will do better by cultivating the whole or part of his property than by renting it to tenants.

The policy adopted in the United Provinces of running demonstration farms on commercial lines and making them financially successful has had the effect of inducing a number of landowners to take up farming. I consider that cautious propaganda will result in gradual and valuable progress along the above lines. In the past, the difficulty of securing a compact area has prevented some landowners from starting their own farms. Recent tenancy legislation has helped to overcome this difficulty, and district officers can now do much to encourage landlords to farm some of their own land by assisting them in getting compact blocks. The Agra Tenancy Act of 1926 has created a new type of statutory tenant with a life-long lease of his holding. As a result, many landlords may think it worth while to experiment in farming, particularly when land becomes vacant at the expiration of the statutory tenancy terms, instead of allowing a new tenant to take possession.

The landless man of enterprise wishing to take up farming on a fairly large scale is now handicapped by the difficulty of getting land.

Oral Evidence.

34,311. *The Chairman*: Dr. Parr, you are Deputy Director of Agriculture in the Western Circle of the United Provinces?—Yes.

34,312. You have given us a note of the views which you wish to put forward. Would you like to make any statement in amplification of those at this stage?—I do not think so. I beg to remind you that I also wrote part of the memorandum. I may say that when I put up my answers to these questions, I added a forwarding note to the effect that most of the information given by me in answer to these questions had already been given in the "Report on Agriculture," prepared by the United Provinces Government.

34,313. Would you give the Commission the history of your own posts in India?—I have been Deputy Director of Agriculture of the Western Circle ever since I came to India, except for a short period of six months during this year when I officiated as Director when Mr. Clarke was on leave. Otherwise, I have been in the Western Circle the whole time, except for a few months when I first arrived which I spent in Cawnpore.

34,314. How long ago was that?—I came out in 1907. I was away for five years during the War; the rest of the time I have been in the United Provinces.

34,315. Would you give us an indication of the extent of the Western Circle?—It comprises roughly two Divisions, the Divisions of Meerut and Agra, with a small area of one or two hill districts. I may say that originally it also comprised the Rohilkhand Division, but as we developed, that was cut off and made into a separate circle.

34,316. You have had a long experience in the Provinces. Would you tell us your views as to the services which Pusa as a central station has rendered?—As an Imperial station, I think it has done extremely little for the United Provinces. We have been benefited from the work on wheat, but I think we benefited from it, to a great extent, because the soils of our eastern districts are very similar to those of Bihar and Orissa, and it was a local investigation almost, as far as we were concerned.

34,317. How about sugarcane?—We have benefited from that very greatly already, and the prospects are extremely good. The Coimbatore canes in my circle are extending almost more quickly than I can provide seed, and the prices the people are willing to pay for seed are extremely high. But, of course, we do not want to go too fast; we want to prove that the canes are really going to be good.

34,318. Sugarcane breeding is in a position which is different from that of any other crop, because of the fact that you cannot breed cane in these latitudes?—I think if the work could be carried on in the United Provinces, we should make even more rapid progress than is being made at present, and I understand there are prospects of that being possible. I understand that there is a possibility that under hothouse conditions one may hope to breed sugarcane in Northern India.

34,319. Have you any indication as to whether that is likely to come about?—I read about it two years ago in the Pusa reports; they were hopeful.

34,320. Turning to the substance of your note and your answer to Question 1 of the Questionnaire, on page 93, you are dealing with the selection and plant breeding work that has been carried out. Did you hear the evidence that Mr. Clarke gave yesterday?—Yes, I did.

34,321. Do you agree with Mr. Clarke that the results now being obtained in rice, cotton, barley, oil seeds, fibre crops and potatoes are disappointing?

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—I am not in a position to say that. The results are more or less preliminary at present, and only one in close touch with the work could express an opinion on it.

34,322. Further down on the page you say, "As the public awakens to the possibilities of agricultural improvements there will, no doubt, be a demand in the Legislative Council for the expenditure of much more money on the Agricultural Department." Do you see signs of a quickening interest in agriculture?—Yes, very great. Mr. Clarke is in close touch with the Legislative Council; he gave figures yesterday showing the very rapid increase.

34,323. How about the position in the districts that you know well, from the point of view of public interest?—It is greatly stimulated, and the way to stimulate it is by success, and no other way. It is stimulated because we have been successful, and only to that extent, in my opinion, is it stimulated.

34,324. Is there cotton in your circle?—Yes; mine is the centre of the most important cotton growing tract.

34,325. What is the principal pest that you suffer from?—The boll-worm.

34,326. Is the officer from the United Provinces, who went to Egypt to see what is being done in that country in relation to this pest, still in Egypt?—He has come back.

34,327. Was that investigation valuable?—Yes. I think it is very valuable. In Egypt they have advanced further than we have, in that they have already started methods of control.

34,328. Do you know whether he saw what was done in the Soudan?—I have not seen his report, but I think he did. I had a conversation with him, but I do not remember that point now.

34,329. *Sir Henry Lawrence*: Who was that officer?—Mr. Richards. He is now acting Principal of the College.

34,330. *Professor Gangulee*: Has he submitted any report?—I do not know. He told me just when I handed over charge that he was writing a report, but whether it has come in or not I cannot say. A certain amount of information regarding his general conclusions is contained in the United Provinces "Report on Agriculture."

34,331. *The Chairman*: You give us an interesting account of the demonstration and propaganda work being carried out by the Government, and we had full evidence on that yesterday from Mr. Clarke. Do you feel that from the research side you have been supplied with a sufficient number of new varieties of sufficient quality fully to employ this propaganda machine?—I think an improvement obtained by the research side is of very great importance, but in a few years it becomes known, and at present I am rather inclined to think that unless more research is done, within a few years our propaganda staff will outstrip the research staff.

34,332. That is the impression which I had formed?—I do not think it is the case at present. After all, we have covered only a part of the Province, and although we have introduced improvements in certain districts, there are many other districts that still require tackling with regard to those problems.

34,333. Would you agree that it follows from that that it is very important that the research side should be a stage ahead of the propaganda side?—Yes; I am in favour of strengthening our research side.

34,334. Do you have any difficulty in getting demonstrators to live in the villages?—Not at all.

34,335. Merely a matter of discipline?—It is a matter of getting the right type of person. If you get a person who is too highly educated and highly paid, he is not inclined to live in the village, except as a supervisor; he does not make the best demonstrator.

34,336. On page 94 in your answer to Question 3, you say "The established practice of the department is to start the demonstration of some form of intensive cultivation when a tube well has been completed. Under a scheme recently sanctioned, owners are granted part of the cost of new installations in places where the department requires facilities for demonstration or seed production, if they undertake to lease small areas of land to Government for a term of years and to supply water at fixed times and rates." Is it only in cases where the department proposes to make use of the land and irrigation for demonstration purposes that the grants are given?—Yes. At the same time, the general grant of assistance in the form of free service is given to every tube well. This is a special money grant. Yesterday, this question was raised, and a total subsidy of Rs.6,000 was indicated. I think the whole of that in the statement is a subsidy in the form of services rendered by the engineering staff.

34,337. Would you look into that?—I think I can clear up the point. In many cases, in addition to the ordinary subsidy given in the form of free services, when we pick out one of these men to help us he is given a cash subsidy from the Agricultural Department of Rs.2,000 or Rs.3,000. So there is a general subsidy to everybody in the form of free services, and in addition the men we wish to help are given a cash subsidy of Rs.2,000 to Rs.3,000, or less. I rather think that is not included in those figures; that was my impression yesterday. We have a total amount of Rs.6,000 mentioned in Mr. Clarke's evidence.

34,338. Can you tell the Commission in how many cases this further subsidy for services promised in the matter of demonstration has been given?—I think that is given in Mr. Clarke's evidence. I was reading it last night and it is mentioned somewhere.

34,339. Are not all these subsidies for tube wells?—Some them are for tube wells, but some are given to ordinary producers who have no tube wells.

34,340. *Sir Henry Lawrence*.—Two hundred tube wells with engines and pumping plant have been completed?—I think the number subsidised is 35 of both tube well people and people without tube wells. This is a system which has been running for two years now.

34,341. *The Chairman*: But it is quite clear that the subsidy on account of the undertaking to help in propaganda is a cash subsidy over and above the assistance in services rendered in constructing the tube wells?—Yes, cash paid to the man on an agreement.

34,342. At the bottom of page 94, in answer to Question 3, you say that gradually it will be possible to deal with organised bodies of cultivators in the form of agricultural associations. Is there any improvement of that sort yet?—I am afraid there is not much, but a few associations have been formed. Probably out of every three that are formed one survives for a period and the others disappear. I think that is the most unfortunate feature of our work; there is not sufficient enthusiasm to carry on the work by local bodies.

34,343. Is not your sentence there a little optimistic?—At the time I wrote this I felt that much could be done by organising some sort of district development committee and I still hold that something can be done. We have at present special committees of the District Board. When they are made up of enthusiastic agriculturists, they help us considerably. Many

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schemes, as Mr. Clarke pointed out yesterday, have been carried on by them and I think we must look forward to that form of non-official help developing.

34,344. I think these committees of local bodies depend to a very large extent on the lead of one or two enthusiasts?—They do. If we could get eventually rings like rural councils or *tahsil* associations made up of men actually engaged in the work; for instance, if we could combine ten men running tube wells and making money out of agriculture into an association, we could approach them as a body instead of individually, and it would be a good thing.

34,345. You have no village group or *tahsil* association at all?—There are a few.

34,346. On page 95, in answer to Question 4, you say that the procedure followed by the Indian Central Cotton Committee seems to you an excellent one and could, you think, be copied by the Government of India with advantage. What exactly had you in mind when you wrote that?—My idea is that research has to be carried on by the Provinces. It has to start as a local effort. We have a large number of problems that require tackling, and in so far as we are not able for financial reasons to tackle these ourselves, I think the Government of India, if funds were at its disposal, could help us in the same way as the Indian Central Cotton Committee; when it was formed, it wished many problems to be investigated which the Provinces were not in a position to take up, and it was willing to finance the investigation of those problems.

34,347. The Indian Central Cotton Committee is an instance of the organisation of research by crop rather than by area?—It is by crop, but it finally comes down to doing that investigation provincially; it is localised investigation. The question requires answering in two parts. First of all my opinion is that investigation must be begun locally and probably it may branch out eventually into being an investigation which influences more Provinces than one. Secondly, as to the financing of that investigation. I think funds will have to be under the control of the local people who are doing the investigation.

34,348. What was your own training?—I took an agricultural course in Edinburgh and then I went to Germany, and from there to America. I took my Ph.D. in Germany and an agricultural diploma at an American agricultural college. I went to Leipzig in Germany and to the Iowa Agricultural College in the United States of America.

34,349. Did you study the working of the Departments of Agriculture in the United States?—Yes, I have always taken an interest in it. At the time I was there, there was no federal research carried on in Iowa. All the research was being done by the State Government, and it got its funds by appealing to the local Legislature.

34,350. *Sir Thomas Middleton*: What year was that?—That was in 1906-07.

34,351. The Hatch Act was passed in 1888?—We had to appeal to our legislature to get funds.

34,352. A grant from the central fund?—The Hatch fund was given them.

34,353. I was under the impression that every year there was a big campaign carried on to get funds just before the budget time of the Legislature?—That might have been so, but there was a large fund available for the experimental work of the State from the central exchequer.

34,354. *Professor Gangulee*: What was the main line of work in which you were chiefly interested in Iowa?—I was studying the method of animal breeding.

34,355. You did not carry on any work in plant breeding?—No, not at all. In Leipzig my work was concerned with soils.

34,356. *The Chairman:* On page 95, in answer to Question 7, you are comparing the difficulties in the matter of consolidation of fragmented holdings in the Punjab with your conditions in the United Provinces. You say your difficulties are greater. Would you explain that?—I think we have to deal with smaller people and people who are tenants and sub-tenants, whereas I am under the impression that in the Punjab a very large number of them are proprietors.

34,357. What is the depreciation allowed for in the case of a tube well?—About 9 to 10 per cent. I think it is given a life of ten to twelve years.

34,358. On page 97, in answer to Question 10 (a), you say that where water is at all deficient the cultivators are reluctant to use it in growing crops for which they get no immediate financial return. Under canal irrigation, I take it, a green manure crop which was irrigated would be charged for on the ordinary acreage basis?—Yes, it is on the ordinary acreage basis.

34,359. Do you think it pays the cultivator to apply green manure?—Yes, certainly, under conditions of irrigation. It is the only way I have been able to make farms pay. I could not have done it without green manure.

34,360. You say where water is at all deficient? Is not it rather where water has to be paid for?—No. The point there is they must use it to grow the crops which they depend on for their livelihood.

34,361. Both crops require water at the same time; both manure and other crops?—Yes.

34,362. Have you formed any firm idea yourself as to whether artificial fertilisers would pay on the irrigated land in the United Provinces?—I think they will pay, where there is more intensive cultivation. Prices are dropping now. It is entirely a matter of price. As a matter of fact, during the last year there has been a big change in the attitude of the manufacturers and of the consumers towards this question. There is a very large amount of private propaganda being carried on by firms interested in the sale of these manufactures, and they have carried out a large number of experiments in villages. I think we have arrived at a time when we can definitely recommend these manures.

34,363. You do not suggest that they would pay only in the case of garden crops? What do you mean by intensive cultivation?—They would pay immediately for potato cultivation, sugar cultivation, and so on. But I do not think they will pay for ordinary wheat cultivation where a low standard of cultivation is the custom; but where a high standard of cultivation is possible, where there is plenty of water, I think they will pay for wheat cultivation. I think at present there is quite enough ground to cover in devoting attention to sugarcane and potatoes; the demand will grow gradually from that basis.

34,364. Is potato cultivation increasing?—Yes, I think it is, though not very rapidly.

34,365. Where does the seed come from?—A very large amount of it is local seed. A certain amount of it is imported at different times from Assam and the hills.

34,366. Are there any particular tracts where seed is grown?—In the past one district of the United Provinces had a reputation for supplying good seed. Now that has become diseased and people have to look elsewhere for seed. We are encouraging them to go to places like Assam and also to get seed from Dehra Dun and the hill tracts.

34,367. Is any seed coming in from Europe?—If it is coming to the United Provinces, it is coming via the Bombay Presidency.

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34,368. *Sir Henry Lawrence*: Do you get seed from Mahableshwar?—No. Our improved seed has been chiefly our own hill seed.

34,369. When you say you get it from Bombay, do you mean grown in Bombay?—I refer to private importation.

34,370. *Sir Ganga Ram*: Does it come from Italy?—Yes, but it does not come to us direct.

34,371. It is the same thing. It does come from Italy?—Yes, it probably does.

34,372. *The Chairman*: On page 98, in answer to Question 11, you express the view that it would be well if commercial agencies would take up the business of seed supply. Do you see any improvement in that direction?—Not much, except in so far as it has been stimulated by the grant given to private individuals by the Agricultural Departments. We hope that these farms which are subsidised will become pedigree farms and a source of pure seed. We are only too anxious to try and get someone of that description to come in who will carry on the work.

34,373. There is no suggestion of a monopoly in that case?—No.

34,374. Is it your view that reasonable profit could be made by the distribution of improved seeds?—Yes. In some crops we are deriving a large profit even at present.

34,375. On page 98, in answer to Question 12, you touch on the important problem of ploughing before the rains, in order to get moisture into the soil. Is it possible with bullocks to break the hard ground before the rains begin?—Yes, it is quite easily possible, but at the time the bullocks are busy; the climate is extremely hot and the ordinary man has so much consideration for his bullocks that he does not wish to use them for that purpose.

34,376. Have you any suggestions to make?—No. I think the most hopeful line of development is to make it possible for a crop to be grown at that time instead of having to plough the hard ground. Our aim is to try to increase our irrigated area so that there will be little need to plough before the rains.

34,377. At the bottom of the same page, in answer to our Question 14, you say there is a definite shortage of working men, in busy seasons, in some districts. Is that shortage of labour confined to particular areas?—Yes, I should say it is confined principally to the Western Circle which I know best; I should say it is not a fact as regards the East.

34,378. Then you say, as a consequence, an enhanced demand for machinery has arisen. Do you definitely associate this increasing demand for labour-saving machinery with those districts where labour shortage exists?—Yes.

34,379. Quite definitely?—Yes, definitely.

34,380. What labour-saving machinery is used?—We are using a lot of ploughs, and at present probably the most interesting and important problem is the question of threshing; we are just about at the stage when I think power driven threshers can possibly be introduced. The cost of threshing, on account of the rise in the cost of labour and the cost of cattle, has gone up considerably, and I think if we could get a machine which could thresh, at 4 annas a maund, we could compete with local methods.

34,381. Do you think it is necessary that there should be a chaff cutting machine?—It has got to be a *dhusa*-making machine.

34,382. That is essential?—Yes, absolutely essential; we have got several in the country, and I had one touring in my circle. One toured in the

Muzaffranagar district, and from my experience of that machine I am giving my opinion.

34,383. Whose machine was that?—It was a departmental machine. We travelled round the district to some extent, just the same as a threshing contractor would at home.

34,384. *Sir Ganga Ram*: Whose make was it?—It was Ransome's.

34,385. *The Chairman*: Did you adapt it or alter it in any way?—No, we did not alter it. A few years ago they sent out an engineer to study this problem, and this machine was made to suit Indian conditions, and it has, within certain limits, answered extremely well.

34,386. It stands the temperature?—That is the one thing it does not do very well; it does its work when it is in good order.

34,387. In a case of that sort, are you in touch with Messrs. Ransome?—Yes, in close touch.

34,388. Do you see any signs of Indian firms competing?—Not in machinery as complicated as that, but in all simple machinery, yes.

34,389. That is a very special line, is it not?—Yes, it is a very special line and the experimental work has been already very expensive. But small things like bullock gears and ploughs are being made in large quantities in the country itself, and can be made quite well.

34,390. You do not touch upon animal husbandry at all in your note?—No, that is outside my sphere.

34,391. But you told us you spent some of the earlier years of your life in studying the problem, and I have no doubt you have formed views on the subject?—Yes; my brother carries on the work in this Province, and we have discussed it fairly thoroughly at different times.

34,392. Is the fodder question a burning one in your area?—Yes, it is very, very important.

34,393. Is any fodder grown at all?—Yes, large quantities of fodder are grown as a cultivated crop, and, of course, in addition, the by-products of ordinary grain cultivation are very important, such as straw.

34,394. What is your own view about the silo as a contribution to this problem?—I think it is almost essential for dairying work; if dairying work is going to be developed, I think that is the only form of succulent food that the country offers, but for other types of animals, such as bullocks for working, I do not think it is likely to come into extensive use, because the ordinary cultivator has almost sufficient fodder in the straw from his crops.

34,395. Are you satisfied with the condition of the ordinary working bullock in the season of fodder shortage?—No, he goes down very much in condition, but it is extremely difficult to see how you are to cope with it; the man goes down too. At present it is a question of the value of fodder and the value of cattle as compared with the value of grain.

34,396. In your own district, is the population a meat-eating population or in the main vegetarian?—In the main vegetarian.

34,397. Is dairy produce consumed by the population?—Yes, to quite a large extent. My circle is probably the richest circle in the United Provinces, and more dairy products are consumed there than in any other circle.

34,398. Milk and *ghi*?—Yes.

34,399. Have you found that the families that consume dairy produce are better nourished and stronger, as a rule, than those that do not; have you been able to observe that at all?—I do not know that I should

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care to say that; they are better off, and because they are better off, they are better nourished. When they can buy luxuries, as one might almost describe dairy products, they do buy them, because they think that is a very important item of their food.

34,400. Is the keeping of the cow by the cultivator a common practice in the district?—Yes, very common.

34,401. Are the milk yields very low?—Yes, they are low; the people who really want milk and milk alone keep buffaloes. The man who keeps a cow hopes to raise some milk and also probably to raise a male calf for his cultivation.

34,402. *Professor Gangulee*: Is the yield of milk decreasing in your experience?—I do not know that I would care to say that it is; but the yield of the animals is extremely low. With the exception perhaps of the Murrah buffalo, the individual yield is extraordinarily low. A very large proportion of the cattle are uneconomic from the dairy point of view and could not be kept if the only product was milk or some form of dairy produce.

34,403. *The Chairman*: Would it not be a great contribution towards the well-being of the cultivator if it were possible to provide him with a cow capable of yielding, say, 100 per cent. more milk, which, after all, is not a very ambitious proposal?—It would undoubtedly.

34,404. As well as providing him with a male working animal?—Yes, it would undoubtedly.

34,405. Have you any co-operative organisations in your district?—A very large number have been started and have died and have started again; a large number of ordinary village societies do exist in various districts.

34,406. Have you formed any view as to the soundness or the reverse of the co-operative credit movement in your district?—My experience corresponds with that of many people who gave evidence before the Oakden Committee, that at present we have not established it on a wide scale on a sound basis.

34,407. Is there any vigour in the primary societies in your district?—Only very occasionally.

34,408. Are the agricultural areas contiguous to forest districts?—To a small extent, not to any great extent.

34,409. Do you find the Forest Department reasonable in its attitude towards agriculture?—Yes.

34,410. Is there friendly co-operation between the two?—Yes. We do not meet very much; the districts are away in the hills; they are the districts we have touched least from an agricultural point of view.

34,411. What proportion of your circle is canal irrigated?—I should think probably 25 to 30 per cent. of it: 30 per cent. probably.

34,412. Are you in close touch with the Irrigation Department?—Yes, we are in close touch with them; I have to be to get water for my farms; otherwise I should get none.

34,413. But you do work in friendly collaboration?—Yes, we discuss everything in full.

34,414. Have you any system of local round table meetings between yourself and the Irrigation Department and any other department, touching the interests of agriculture?—We have a Board of Agriculture of which I am a member, and of which the Chief Engineer is a member.

34,415. That is for the Province; but have you anything in your circle?—We have Farm Committees which advise, and also to some extent control, the policies followed by the farms, and then we have District Board Agricultural sub-committees.

34,416. In spite of many difficulties, I understand that you do definitely form the view that there is an increasing demand from the cultivator for expert advice and assistance?—Yes, undoubtedly; when we have anything to give him we can easily find the men who are willing to take it.

34,417. *Sir Henry Lawrence*: On page 4 of your statement, you mention that farms are the centres of pilgrimage for large numbers of agriculturists from considerable distances. Do you keep any record of the number of people who come to see your farm?—No, not an actual record, but at certain times of the year, for instance, last year, when we were supplying sugar-cane seed, large numbers came.

34,418. Do they come in tens, or hundreds, or thousands, or what?—In the months of February and March of last year there would probably be 200 passing through the farm in the course of one day.

34,419. That is in order to obtain setts?—Some of them, yes; and then also, for instance, at the time of a local fair, or at a time when there is any particular movement on that brings the agriculturist into that headquarters, many of our farms that are near to headquarters receive very large numbers of visitors.

34,420. Do you keep any special staff whose duty it is to show these people round and explain things to them?—The Farm Superintendent is usually a very well qualified man; he has an assistant, and at times of rush some of the demonstration staff may come in, if necessary, to assist him. I do not think there is any lack of facilities to enable the people to see what they want to see when they come to those farms. For instance, at the time of a local fair, in addition to the ordinary farm staff, if we are doing demonstrations on that particular farm, some of the demonstrators from the district would be called in to help.

34,421. I did not quite understand your answer about the difficulties of work in the United Provinces compared with the Punjab. Is it the case that the tenants in the United Provinces have not the same incentive to improve their cultivation?—I think you misunderstood me; that was a question merely with reference to difficulties of consolidation of holdings, I think.

34,422. What is the effect of the form of tenancy here?—I think it makes it more difficult for us to consolidate holdings.

34,423. It is not the case that they have less incentive to improve their cultivation here?—I do not think so, no.

34,424. The tenant reaps the benefit from any improvement in cultivation?—Absolutely; no one else reaps any direct benefit from it.

34,425. Are these fertiliser firms who are now carrying on some propaganda English, Indian or American?—One big agency is the agency for the Chilean Nitrate Company.

34,426. What is its origin?—The great world-famous Chile mines in South America that supply nitrogen to every country in the world; they are just starting to develop their propaganda in India.

34,427. Is it an English or American organisation?—It is Chilean, I suppose.

34,428. *Sir Thomas Middleton*: International probably?—Yes, probably. And the second one is called the British Sulphate of Ammonia Federation. That is the second Company which has started work recently in the United Provinces. They buy some of their produce in Europe, and a certain amount is manufactured in the coal fields of India itself. Up to a few years ago I believe that that manufactured in India more than met the local demand, but as the demand increased importation began.

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34,429. *Professor Gangulee*: But the British Sulphate of Ammonia Federation are not the manufacturers?—No, they are merely an agency.

34,430. *Sir Henry Lawrence*: You get sulphate of ammonia from Tata's Works?—It comes to us through this agency, and they collect it from Tata's and all the steel people in India. Exactly how they get hold of it through these people I cannot say.

34,431. Is there any purely Indian firm working in this?—All their local agents are Indian. In the last year or so they have engaged a large number of Cawnpore college graduates to do propaganda work, and in addition to that they have established agencies in very many districts.

34,432. You have passed a considerable number of diploma holders out of your College. Do you know if any of these men have set up as seed merchants or as implement agents?—I do not think that any of them are doing that business. None of them are seed merchants; in fact there is nothing of that sort in the country. Some are carrying on seed supply incidental to their farming operations. There are no such implement agencies.

34,433. By the expression "in the country" you mean in the United Provinces, I take it?—Yes, all I say refers to the United Provinces.

34,434. In Mr. Clarke's reply we were told on page 3 about the difficulty of the young officers getting experience in the work in respect of rice, cotton, barley and so forth. Has it been the practice here to send any of these officers to study what is being done in other Provinces?—They are allowed quite a lot of freedom to visit other Provinces. When I was officiating Director, quite a number went on tour to other Provinces to see what was being done there.

34,435. Is that the recognised practice of the department?—Yes, and I think it is a very, very important thing.

34,436. Can you state whether any one in particular went to study rice, for instance, in Bengal or Madras or Bombay?—Yes, the rice officer did go to Bombay at the time of the Poona Show, as far as I remember, with the idea of seeing the show and discussing rice problems with the Bombay people. Another officer went to Bengal chiefly on horticultural work.

34,437. But I suppose only to study conditions for a few days?—He went merely as a visitor in order to discuss things with a man who was doing similar work, and not with the intention of taking a course of instruction.

34,438. Have you ever seen the work in the other Provinces?—Yes, I have travelled in many Provinces. I was at Poona during the Show; that is the most recent visit I paid outside the Province.

34,439. You were regularly deputed by your Government to do so?—I was not deputed. I merely asked permission to go and it was given. Deputation is not the practice; it is very rarely done. But permission can be obtained by a man from his Director to visit another Province. That is the only formal procedure necessary.

34,440. Is that done by all the Deputy Directors?—It is a matter for the Deputy Director to choose. I could not say to what extent other Deputy Directors take advantage of these facilities. The facilities are there.

34,441. In this Report by Government it is stated that public attention has been much more attracted to the improvement of cattle than in former years. What particular form does that public interest take?—The present form that it is taking is the desire to get better bulls, and the willingness to pay prices that would not have been paid in the past. The officer in charge of cattle breeding considers that a primary line of improvement, that people should recognise that the present system of using any type of bull should cease.

34,442. Has this interest been awakened in all classes of the community, amongst the big landowners, small peasants and *gowalas*?—All classes of the community that live in the real cattle breeding tracts. Some of the United Provinces districts breed very few cattle, and cattle breeding is of too little importance. Some other districts are what one may call cattle breeding tracts, and in many of these tracts the officer in charge has been able to see a very great deal of interest aroused.

34,443. Is the dairy of any interest or importance now?—It is not of very great importance. The chief problem, so far as I am aware of the matter, is to place milk already produced on a market where it can be sold. The primary problem at present is, I believe, one of transport.

34,444. How is the transport done?—At present most of the towns depend upon a very small area surrounding the town for their milk supply. A small amount comes into town on the heads of coolies and a small amount on *ekkas*.

34,445. There is no organised supply by rail or motor, is there?—None at all. We are just starting to develop the matter of supply. At present there is absolutely no transport by rail.

34,446. Are you developing the motor transport?—I am afraid I am infringing on the domain of another officer who is going to be examined later on, because these are his schemes.

34,447. *The Chairman*: He is your brother?—Yes. He is developing a scheme of collecting and bringing milk in from a distance. A motor collects village milk and brings it to a centre at a considerable distance from the producing area.

34,448. *Sir Thomas Middleton*: You are responsible for chapters 2 to 9 of the Report on Agriculture?—Yes.

34,449. In chapter 3 you give a very interesting account of the development of the Agricultural Department. I think we may regard the department here in the United Provinces as a pioneer, as you did more in the earlier days than possibly any other Province in agricultural education?—Yes.

34,450. You had a Director as early as 1876?—Yes.

34,451. When you were collecting the information for this chapter, did you come across any special reports or memoranda by the late Sir Edward Buck which would be of interest to us as a Commission?—I did not, but I knew Sir Edward Buck; he has stayed with me at different times. As regards this particular memorandum, I did not find any material.

34,452. I am wondering if he left anything on record?—There is a lot on record in the agricultural office left by him.

34,453. Because he probably gave more thought to this subject than any man of his time?—Yes. I think he was extremely interested in every form of agricultural activity.

34,454. The early development up to 1900 was really his development?—Yes.

34,455. It was in 1906 that you first enlarged the department substantially and you had an Economic Botanist appointed in the person of Dr. Martin Leake, and an Agricultural Chemist, Mr. Clarke. Then the first notable change in policy that we notice in your history was in 1913 when it was decided that the effort to train men for the Revenue as well as for the Agricultural Department should cease. That policy, I think, was laid down by Sir Edward Buck, and I am wondering if you could tell me what led to the change?—The impossibility of accommodating both types of men; I think I have put that in the note.

* Report on Agriculture in the United Provinces. (Not printed.)

34,456. It was not that the training given was found unsuitable for the *Kanungo*?—I think it was impossible to reconcile the different types of training required by the two types of officer, and we could not raise the standard of the agricultural college to the standard we wished if hampered by the training of a class of man whose training was not to be carried up to that height.

34,457. Can you tell me anything about the experience of the Local Government with these *Kanungoes* who were trained at the college in the earlier days? Were they notably better in their work than the others, or the other way about? Mr. Clarke yesterday suggested that some should be reserved appointments in the Superior Revenue Service for Cawnpore students?—I do not know that I can express an opinion; I do not think I have ever heard that discussed. They are a small number after all, in relation to the total number at present working in the Province.

34,458. Then you made a further rapid move forward in the period immediately after the War, and it is since that period, I think, that you have employed an Entomologist?—Yes. Of course, recruitment was stopped during the War and that was an accidental break in our development. It was not that the Entomologist was employed because of the increase of interest displayed. He was a necessary member of the staff to be recruited as soon as funds permitted and men were available.

34,459. The intention to appoint him existed in 1914?—Yes.

34,460. In paragraph 104 of the Report on Agriculture, you refer to the success made of these demonstration farms that have been run on commercial lines. How many of these commercial farms are exclusively dry crop farms?—A very, very small number of them. I think I would be safe in saying none at all. There are none in my own circle.

34,461. How many of them are cattle-breeding farms?—Cattle farms are not run on those lines.

34,462. So that the commercial success at present is being achieved entirely under irrigation and intensive cultivation?—I might say, as regards cattle breeding, we do not think that any private farm can be run as a commercial success. It is not a commercial proposition to breed cattle on a large scale at present in the United Provinces.

That is what I expected you to say.

34,463. *Sir Henry Lawrence*: Why?—The cost of raising them under ordinary cattle farm conditions is higher than the money you can get for them. Where they are raised at present, a very large number of cattle are raised by a subsidy in the form of free labour and feeding; one might almost say that it is often free food, in that no charge is made for it, and it is of very little value. When you bring everything on to a balance sheet, and calculate what amount of cash you would have to pay for the labour that is at present given free by the women, and other things, you will find that you are down every time.

34,464. What is the present price of a pair of bullocks?—A really good pair of bullocks, up to our first class standard, would be worth about Rs.350.

34,465. What would be the price of a normal cultivator's pair?—In my Circle, you will find with the cultivators plenty of bullocks worth Rs.350 a pair. They go up to the Punjab fairs and our own fairs and pay that price for them; many of the rich Jats in the western districts of the United Provinces have bullocks worth Rs.350 a pair. I buy them in competition with cultivators of my own district.

34,466. *Sir Thomas Middleton*: There are very few such bullocks bred in your district?—There is a certain proportion, but quite a large number of those bullocks come from the Punjab; they are the high type of bullocks.

34,467. But the percentage of bullocks bred in your own district would be very small indeed?—The percentage of bullocks bred in my own district would be small.

34,468. There is another interesting point which you make in paragraph 131 of the Report on Agriculture, relating to the deterioration in sugarcane. Has that been noticed markedly in the United Provinces?—Yes; in my own farms it is noticeable every year with regard to imported varieties of high yielding quality, but of course some of the selected varieties do not deteriorate. Some of the varieties that we have introduced live and prosper for perhaps eight or nine years, and then we find that there is a deterioration. At present we are finding that we can make them live a little longer by getting setts from the hills.

34,469. Can you give me any idea of the rate of deterioration? Is it a case of yielding well for two or three years and then a sudden drop?—With regard to the particular variety I was thinking of, it was probably not until twelve years after it was imported that it showed signs of deterioration. It was imported from Mauritius.

34,470. The rate of deterioration is slow as compared with potatoes, for example?—I think that is rather a dangerous conclusion to come to. For instance, at present we have new varieties of Coimbatore canes, and some of our imported varieties are rather showing signs of a disease that we have not been troubled with in the past. It is mosaic disease, and just how quickly they are going to deteriorate on account of mosaic disease I can only guess. I can only hope for the best.

34,471. Could you tell us something about your experience with your hill-grown cane setts? When they come down, do they appear to you to be completely rejuvenated or only partly?—You cannot say anything from the setts.

34,472. From the crop?—What I have been doing for the last few years is to get seed of a variety grown by private growers in the hills in my own circle, bring it down to my farm and grow it on my farm alongside of cane of the same kind which I have been growing for the last ten years; I find that the difference is extremely marked.

34,473. You have got no definite evidence on this point up till now?—I am not too sure that Mr. Clarke, from his experience of the Province, agrees with me on that point. He has got a sugarcane station in the hills definitely set aside for this type of work of a variety; and I think you may find that the reaction to hill treatment is entirely characteristic. Some varieties may show this deterioration and rejuvenation and some varieties may not. The variety that I am referring to is not grown very much by Mr. Clarke.

34,474. You referred to the fact that there may be some disadvantage from having to breed canes in Coimbatore. In reply to a question, you said you thought that even better results would follow if you could raise them entirely in the United Provinces. Can you tell me at what stage it is safe to grow seedlings in the United Provinces? Could you grow one or two year seedlings from Coimbatore?—I could not tell you that. I think they send them to us in fairly early stages. I think their practice is to send to a Province quite sufficient material of the type suited to that Province; but I do not see why there should be any difficulty about growing safely one or two year seedlings from Coimbatore.

34,475. The point is this: the Director of the Cane-breeding Station at Coimbatore could send you Coimbatore seedlings; if you got them in the early stages, you could judge how they would be likely to do under United Provinces conditions?—That is my suggestion, that work could be more successfully carried on in this Province.

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34,476. It is not necessary to grow the seed; what is wanted is to grow the seedlings under United Provinces conditions?—Yes; under these conditions the early elimination and the routine work could be reduced.

34,477. You have expressed the view that there was the danger that propaganda might outstrip research. Were you thinking mainly of such crops as sugarcane and cotton?—Take sugarcane for instance, and the rate of progress that we are making with the Coimbatore canes in my circle. In 1921 a few seers of Co213 came up to my circle in the United Provinces. Last year, from the Government farm and some of the local farms which are not under our control but in which we take an interest, we distributed 70,000 maunds grown from the original few seers. At present there are 5,000 acres under this variety in the United Provinces; in the next year there will be 50,000 acres at least, and I think the rate of progress will be so rapid that, unless something unforeseen occurs, in my circle 400,000 acres will be under it shortly.

34,478. A good thing requires no propaganda?—No. Anything which increases the yield by 100 per cent, requires no propaganda in any country.

34,479. With cotton your experience is very different? It is a slow business there?—Yes; it is chiefly a matter of organisation with cotton. If you grow sugarcane, it is there for the people to come and take. With cotton you require a special and complete organisation to keep the type pure.

34,480. What you had in mind was that you needed to find good new varieties? If you get them, they will attend to their own propaganda?—For instance, if a man can push four good things at present, he can equally well push twenty good things. A man who has to introduce twenty new things can do it in almost the same time as he requires for four.

34,481. In this Province, have you experienced trouble in threshing wheat clean with machinery?—The chief trouble I have had is a certain percentage of broken grain.

34,482. It is with a high speed drum?—Yes. If you are going to sow the seed, broken grain is a drawback. As most of our seed is for sowing, it is a drawback; I have to take measures to clean it, which involves a certain amount of loss.

34,483. You said that you yourself were not responsible for the cattle breeding work; but I think you have paid a good deal of attention to cattle breeding?—I have always been interested in animals very much.

34,484. You do not find that there is much difficulty in getting the cultivator to use good bulls?—We are just arriving at the stage when he is appreciating the value of good bulls.

34,485. Has he got to the stage at which he recognises that the progeny of a good bull requires a little extra attention?—I think so. Once he has got an animal that is valuable, he is prepared to give it attention.

34,486. How much milk do the cows in your district yield?—They vary; they give anything from 2 to 6 seers.

34,487. How much does the cultivator allow the calf?—He would allow it probably half of that, but it would vary tremendously. In the real breeding tracts a lot of cows are not handled at all. The remark that I made previously refers to the man who keeps his cow tied up.

34,488. I was referring to the class of cultivator in your district. What we have found in other parts of India is that cultivators who may be using good bulls are prepared to do nothing for the calves?—I do not think that is the case with us, because I have seen calves that have been raised from these cows and the Government bulls, and the improvement is marvellous. Not only is there greater bone development and a greater frame, but they show signs of very great care.

34,489. Do the cows have any grain fed?—A certain amount of stuff like cotton seed and *juar* and a certain amount of gram occasionally.

34,490. Even in those cases where cultivators are rearing calves but not keeping cows for the supply of milk. I was then referring to the rural open grazing grounds where they run free. Some of those cattle are not handled from year's end to year's end.

34,491. *Raja Sir Rampal Singh*: Is there any co-operation between the co-operative societies and your department?—There is co-operation to the extent that we are able to co-operate, but there is not much, because they have not advanced to the stage when they can be of much help to us. At present, they are engaged in lending money, and they are not in a position to control any of the activities that we think might fall within their Province.

34,492. Do you think that, if there be greater co-operation, there is much scope for propaganda work through them?—I do. I think there is very great scope, but I think it is a mistake to load extraneous work on to them until they are in a position to justify their existence by making a success of their primary object, which is to lend money to their members.

34,493. Supposing these co-operative Inspectors get some agricultural training, would it be conducive of much good?—Yes, undoubtedly.

34,494. Do the Government bulls reach the villages also?—Yes. Our present policy is to concentrate on certain areas and fill those areas with Government bulls and exclude all other bulls entirely, rather than to distribute our bulls indiscriminately over the whole Province, and in this way to convert those limited areas into big breeding tracts from which we can later draw cattle for the rest of the Province.

34,495. If such a procedure is adopted, how long will it take for improving the cattle breed of the Province?—Of course, it depends entirely on the number of controlled areas we can get into our hands. I think there is no reason why in ten to twelve years' time the whole Province should not feel a very strong effect from this work.

34,496. Would not things improve if the selection of calves was made in the village itself?—That is really the principle that we are working on; only we are going one step further back and making sure that the calf is a pedigree animal. We are putting these bulls into these approved breeding areas, hoping to exclude all other bulls eventually, and then when a good calf is bred in that area we hope to get that calf at a price and pass it on to a district where no good bulls exist. We are doing exactly what you suggest and going a step further back and making sure our animal is not a freak, but a pedigree animal; namely, we want to know its parentage. I believe they are going to keep records of this.

34,497. Can we not get the calves of indigenous tribes castrated in villages so that if some steps are taken to make a good selection some improvement might take place? At present we find cattle are deteriorating?—They are undoubtedly.

34,498. Gradually when we get some bulls from your breeding farms, they may be introduced?—I think you are working on absolutely right lines.

34,499. In your Circle, I believe there are Jats who are cultivators?—Yes, some of the best cultivators are Jats.

34,500. Is it a fact that Jats are better cultivators than other people in other places?—Yes, it is a fact that Jats are better cultivators than *Thakurs* and Brahmins in other places.

34,501. You officiated for some time as Director of Agriculture. Did you find similar improvements in other circles?—I think the circles that

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have been in existence for some years are showing great progress. For instance in the Central Circle and the Shahjahanpur Circle good progress is being made. I did not become well acquainted with the circles farther south; I did not have much time to visit them. There is a lot of room for improvement in the recently created circles.

34,502. In what respect?—In bringing large areas of land under cultivation and introducing hardier varieties of crops. Some of the hardier varieties of sugarcane might succeed there.

34,503. Do these improved varieties begin to deteriorate after some time? I mean to say, if we get Pusa wheat and then sow the same wheat again, it begins to deteriorate?—I do not think it deteriorates, provided you make arrangements for a supply of pure seed; but at the same time, I think, in some cases where the soil is not suitable, deterioration can take place, and I do not think we can say a variety is properly established because it has been tried and been successful for one or two years; it is not unlikely that in ten years it may deteriorate. At the same time, a temporary improvement while we are looking for something better is the line of development. It is difficult to say what the length of life of these improved varieties of sugarcane may be. They may deteriorate, but if they do we have an organisation for introducing something quickly in their place. We are on safe lines there.

34,504. As far as wheat is concerned it is a general idea amongst villagers that in two or three years Pusa wheat begins to deteriorate?—Yes. I really do not understand what that is based on, because I have tested it myself on my own farms and found no difference in yield, taking wheat that came to me in 1910 as compared with that imported in 1924. I have found no difference. I rather think that in many cases there is something that is not understood in this question of deterioration of Pusa wheat. I certainly have not found it to occur.

34,505. Do the cultivators think that the Pusa wheat requires much more watering than the *deshi* wheat?—That is not my experience.

34,506. Three times as much water?—No. Of course these investigations are local, but in my circle the opposite applies. I should say Pusa wheat ripens on less water than the *deshi* varieties. It ripens about eight or ten days earlier, and in that case you can get through in many years with less water.

34,507. *Sir Ganga Ram*: You open your remarks by saying that very little is spent on your department, only one anna per acre; can you also say what credit we can give you for your activities?—That is brought out here. We estimated it, when we wrote this report, at one million pounds sterling. It has been worked out in detail in one of these paragraphs. It was referred to yesterday.

34,508. What page is it?—If you will refer to page 33 of the Report on Agriculture in the United Provinces, paragraph 166, you will find it.

34,509. What I mean to say is that in the Punjab, for instance, the claim is made that American cotton has been introduced. Can you claim the introduction of a new crop?—Yes, Aligarh 19 Cotton. It is a variety that I am responsible for.

34,510. Does that give a greater yield?—Yes. It gives a yield of Rs.15 per acre more than the stuff it has replaced.

34,511. So many rupees more per acre does not mean anything because in some years the rate may be very low?—I mean it gives an increased yield of 20 per cent.

34,512. Is there anything else?—Sugarcane.

34,513. You mean Coimbatore sugarcane?—Yes. Before that Shahjahanpur 48 and several varieties were introduced.

34,514. Anything else?—Pusa wheat 12.

34,515. You admire Pusa wheat. In the Punjab we have discarded it altogether?—Yes, but your Punjab 8 wheat will not grow in the United Provinces at all.

34,516. Why?—It is too long in growing. We have some on our farm at Aligarh. I have tried it for years. It will not grow properly. Probably there is a difference in soil. For instance, we cannot grow American cotton, and for very good reasons.

34,517. That sort of general condemnation does not help. The soil on your farm may be bad. Have you tried it in different parts of the Province?—American cotton?

34,518. Yes, and Punjab 8?—Yes. It has been very widely tried. Your growing season is longer than ours, and that is the crux of the matter.

34,519. Is there any system in your department by which you can know what research is going on in the sister Provinces?—Yes, we read your reports, and I frequently see your Director.

34,520. Is no sort of journal published in each Province in which the activities of each Province may be shown in the line of research?—All departments publish reports. There is this publication* that summarises things in general for the general reader.

34,521. Is there nothing in the nature of a journal in your Province?—No, not for the general reader. Reading is not popular amongst agriculturists in the United Provinces.

34,522. Is agricultural education included in this estimate of Rs.24.4 lakhs?—Yes, it is the whole budget.

34,523. You do not deduct the cost of agricultural education from it?—No. It is included; roughly it comes to 4 lakhs, I think.

34,524. You said something about threshers; I can give you some information. We have tried Ransome's and Marshall's. These threshers were really designed for English wheat, taking out the seed and leaving the chaff behind. They put on a chaff cutter with it to cut the chaff into small *bhusa*. The result of that is that when you cut with the chaff cutter it leaves sharp points which are not eaten so voraciously by cattle as with the other system, and then they introduced bruising with the chaff cutter. Bruising was not a success. Could you say it has been a success anywhere?—I say that the only reason why it has not been successful is the cost. I think your point about the chaff being uneatable is wrong as far as my experience goes. Chaffing has never been any good in the United Provinces. We have never attempted it. Bruising has always been our principle. At one of the biggest farms we use a big bruiser, and our bullocks have lived on nothing else but *bhusa* for ten years.

34,525. Perhaps they could not get anything else?—They are in very good condition.

34,526. What is the cost of threshing under this system?—In 1923 I was unable to reduce it below about 8 annas a maund. I think I can now manage it at 6 annas.

34,527. And does that include the cost of moving the machine from one place to another?—Yes; the driver and everything.

34,528. You could bring it down to 6 annas?—I hope I shall be able to do so. I cannot state it as an absolute fact; I am hoping.

* Report on the Administration of the Department of Agriculture, United Provinces. (Not printed.)

34,529. We have made a trial of tractors in the Punjab. They sent two tractors to my village, and we tried hard and gave it up?—You are the pioneers; we are only followers in the footsteps of the Punjab.

34,530. When you use the words "intensive cultivation" do you mean to include fruit growing as well?—No, it did not occur to me at the time. I was referring to ordinary field cultivation.

34,531. By intensive cultivation you mean only vegetable cultivation?—No, I mean sugarcane and potatoes.

34,532. Anything else?—High types of wheat, but particularly sugarcane and potato.

34,533. Did you observe that in Pusa 12 the whole crop lodges? It does not stand the wind and that sort of thing?—I dare say, in your canal colonies.

34,534. We have given it up accordingly?—But our conditions are very different. We do not raise such enormous crops as you do in your canal colonies.

34,535. Are you aware of the fact that your Province is not quite immune from famine? Under the Famine Commission's law you must have .4 per acre per head protected, while you have only .2 as yet?—We look upon ourselves as immune except from fodder famine.

34,536. Do you produce enough grain?—I think so.

34,537. It is not a question of opinion. Have you studied the figures of imports and exports?—I cannot say. I cannot express a very definite opinion at the moment.

34,538. Do you import a lot of wheat from the Punjab?—Not every year. The re-exports make up for that in normal years.

34,539. Have you studied the imports and exports of your Province?—I have not made a special study of them; I have studied them from the point of view of my own interest, but if you asked me to quote figures, I am afraid I could not do it.

34,540. Are you in a position to classify the yields which you give in this statement, showing how much is canal, *barani* and well irrigated?—I looked into that last night; the explanation is a very simple one. The figures are irrigated and unirrigated taken and averaged.

34,541. Pardon my saying so, but when you strike an average you make a mistake?—If you refer to the last column of that table, you will see immediately the object of it; it was merely put in to give the Commission an idea of the value in money of some of the crops that we grow.

34,542. There is a fallacy again when you refer to the money value?—I should like to know what the fallacy is.

34,543. Prices may vary in any year, and therefore the money value is no consideration?—But the year is quoted.

34,544. Give us the quantity?—You can work it out; you only have to work it back from rupees and yields per acre. The yields and values for the year are given. It was worked out in my office for the benefit of this Commission at the wish of the Government, to give you some idea of the value of some of our crops.

34,545. I ask that that column should be divided into three showing the canal, the *barani* and the well irrigated?—We can give you that; that is the normal method of our statistics; they have been condensed in this table merely to arrive at the figures given in the last column.

34,546. Then you do not give a true figure, because I tell you you stand about fourth among the Provinces with regard to yield?—Then there is all the more room for improvement.

34,547. *Professor Gangulee*: Do you include the improved varieties?—No. The way these estimates are arrived at is by cutting what is looked upon as a normal crop in a village; that is what we call our standard yields, which are revised, I think, every five years. Let us suppose the standard yield of wheat is 800 lbs. covering a period of five years, from 1920 to 1925. The final yields are arrived at by crop estimates, *patwaris'* returns, and so on, showing what the yield that year will be, for instance, 80 per cent. of the normal; the yields are given as percentages of what we look upon as being the normal yield.

34,548. Is that the yield from the improved areas?—No, no improved areas are included in these at all; this is supposed to be the ordinary cultivation of a village.

34,549. *Sir Gunga Ram*: Is there still in your Province a sentiment with regard to the use of buffalo calves for agricultural purposes?—Not a very serious one.

34,550. I ask that question because there is an enormous trade between the Punjab and this Province; owing to this prejudice, your male buffalo calves are bought very cheap, for Re.1 or Rs.2, and are sold in the Punjab?—No, there is a very large number of them employed in the United Provinces.

34,551. I am glad to hear it, because this practice has led practically to the throwing away of part of your calves?—If one investigated the matter, one would find that they are employed to a great extent by the lower castes.

34,552. But there is a very large trade in your buffalo calves which go to the Punjab and are sold in the cattle markets?—In the United Provinces at present every sweeper who is carting bricks is using a buffalo.

34,553. But none are used on Persian wheels?—No, I do not think they are.

34,554. *Raja Sir Rampal Singh*: There is still a feeling among the high caste people?—That is so among the high caste people.

34,555. *Sir Gunga Ram*: When you bore a well, what permanent fixture do you put at the bottom? What measures do you take to prevent the sand getting in?—I do not know.

34,556. Do the Irrigation Department charge you for water that is used for green manure?—Yes, we are paying water rates on that at present.

34,557. It has been remitted altogether in the Punjab?—Yes, I think we might follow your example with advantage. Is this method of green manuring spreading very widely in the Punjab?

34,558. Yes, it is.—What are you using?

34,559. They generally use sann hemp. There is a remark in the report of the Irrigation Commission that in the United Provinces the Irrigation officers pray for drought so that their canal water may be taken; is that so?—I hope not. You had better ask them about that; I should not like to express an opinion.

34,560. The people of course wait for the rains?—Yes.

34,561. But for the purpose of sowing sugarcane, which is the chief paying crop here, you require water before the rains?—We want many waterings.

34,562. You require two waterings before the rains?—We require four in some places.

34,563. Then what method do you employ?—Most of the sugarcane grown on canal irrigation we water from canals.

34,564. But there is none to be had from canals in March and April?—That is when our best supplies are available: in April and May.

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34,565. Then how does this remark apply, that you are always praying for drought?—If they do pray for drought, they are going to make the money in the *rabi*; that is when most of our irrigation is done.

34,566. Do people hesitate to take canal water?—Yes, in years of drought the area under irrigated *rabi* crop is much increased.

34,567. How much delta of water do you consider is required for *rabi*?—It varies in every district; in the west of the Province in a normal year, when the rainfall is 30 inches, 9 to 12 inches of canal water is required for wheat; that is three irrigations of 4 inches each.

34,568. Besides the water that is required for sowing?—We do not water for sowing normally; we sow on the rains.

34,569. Then 9 inches more rain would mature the crop?—In certain districts. In Muzaffarnagar 9 inches in a normal year will probably mature the crop; in Aligarh you want 12 inches; in Agra you want 15 inches.

34,570. 15 inches is the highest?—I should think that would always do it in a normal year.

34,571. How much water is required for maturing sugarcane?—It varies; in Aligarh, for instance, I very often give eight waterings, and in Muzaffarnagar probably five.

34,572. Besides the rainfall?—Yes.

34,573. Supposing there were no rainfall at all, how much would you require?—I should say probably about 55 inches.

34,574. 55 inches for sugarcane?—Yes, probably.

34,575. How much for paddy?—I do not know much about growing paddy.

34,576. Is there not much paddy grown here?—Not in the west.

34,577. I do not understand your statement that the subsoil water flows approximately at the rate of one mile an hour. How did you ascertain that?—I took that from a paper written by a former Chief Engineer of Irrigation in the United Provinces, Mr. Hutton; he condensed a lot of information on this subject from various authors. It was a paper contributed to the Agricultural Journal of India in about 1917; the exact reference is given in the memorandum.

34,578. You say also that the subsoil water is replenished each year to the extent of 12 inches?—Yes, that is averaging the total rainfall over the United Provinces.

34,579. What delta of water do you consider is lost by evaporation?—I think that particular paper gave it at about 20 to 25 per cent., as far as my memory serves me.

34,580. That depends also on the humidity of the atmosphere?—Yes, it depends upon the district very much.

34,581. What proportion of the irrigation water is absorbed by evaporation, how much is used in sustaining plant life, and how much goes into the ground?—I do not know; I could not even attempt an answer to that question.

34,582. In the irrigated area is there a tendency for the water to rise in the subsoil?—Yes, in many districts the rise is very marked.

34,583. Do you think it would be approximately 12 inches a year?—It is cyclic with us; we are now passing through a period of year when the water level has risen considerably.

34,584. Has your Department investigated the level at which it begins to flow towards the river?—Yes, Dr. Leake wrote some very interesting papers on that twenty years ago.

34,585. But are his statements correct?—I think that is fairly correct; I think that is accepted.

34,586. There are no investigations going on now?—Yes, the Irrigation Department has got an enormous number of records on that particular subject.

34,587. Have you arrived at any solution of the problem of *usar* lands?—No; I worked on it for twelve years and then gave it up.

34,588. We have already found that by the use of little cross drains we can grow cotton on such land?—Your *usar* land is entirely different from ours.

34,589. Why?—You can hope to drain your land, but we cannot because it is, as it were, enclosed in a bucket.

34,590. Does draining do no good?—I studied this problem of draining for very many years; the quantity of water required is enormous.

34,591. It is only impregnated with sodium salts?—Yes, but that sodium has got to go through the bottom of a bucket.

34,592. We have found that cotton does grow? In my own village I have tried it with success?—I have grown rice and barley on this land. I have grown very good crops of rice and barley, about 20 maunds to the acre, but I would not like to tell you what was the cost of growing it.

34,593. You think that constant ploughing does not improve it?—I do not think so. There are some experiments going on in the east of the Province and I do not think that constant ploughing has improved it.

34,594. What class of potato is grown in your Province?—We have imported a very large number of English varieties into the hills, and some of these varieties have done fairly well in the plains. I have grown them myself and I found them doing fairly well.

34,595. Do you grow onions?—Not on the farms.

34,596. Is there any special attempt made to grow onions?—Yes, round the cities they are doing it.

34,597. *Sir James MacKenna*: With reference to these crop statistics and the question of improved varieties coming under them, I take it that the position is that these improved varieties will not come into the crop estimate of average yield until they have become so general that they become the normal crop?—Yes, it is a matter now of deciding that question. I think we might begin to think whether they ought not to be included. At present we are only just beginning to get *patuaris*' returns of improved crops. Two years ago we were getting none, and last year we got only a few.

34,598. Gradually, as you extend the improved varieties in a particular area, that would naturally come into the estimate of the normal out-turn?—Yes.

34,599. But in areas where they were not to any great extent grown naturally you would accept the normal crop of the area?—Yes.

34,600. Where are you headquarters?—Aligarh.

34,601. You live on the farm?—Yes.

34,602. As a senior Deputy Director of Agriculture, I want to ask you what your views are on the functions of the Deputy Director of Agriculture? Of research and propaganda which do you think is the first duty of the Deputy Director? Are you doing any research work yourself?—I am doing a little. Since 1921 I have not been doing much because there is no time. I do not think that you can absolve the Deputy Director from either duty. He has got to carry on experiments, to try and solve his own local problems, and I am rather inclined to wonder whether it would not be a good plan to put a special officer in charge of experimental work.

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34,603. Would you call him a crop specialist?—No, a Divisional Superintendent working under the close supervision of the Deputy Director. We have a scheme to introduce a man of that type.

34,604. Are you strongly of opinion that it is an advantage for the Deputy Director to live on one of the central farms?—I would not insist on his living on a farm, but he ought to be in a position to spend a lot of his time on it without travelling any long distances.

34,605. On page 94 you say, with reference to the extent to which the new seed is being distributed and propagated, that many lakhs of acres of improved varieties of crops are now being grown in the Province. Have you any accurate survey of these areas?—We have accurate surveys of one or two *tahsils*.

34,606. You will agree with me that these figures are difficult to get accurately?—Yes, but I think we will arrive at accuracy in the next few years.

34,607. Because the more consolidated the blocks the easier it becomes?—Yes.

34,608. These are extremely dangerous figures to draw inferences from, are they not?—Yes. If I were ever criticised for putting up those figures I should merely have to refer to the figures given in the departmental report for the year 1926 which show that in some *tahsils* an improved variety of crop has almost eliminated the variety which we are attempting to replace. And it only requires an inquiry to be made in that *tahsil* to find that those figures are not excessive. They are usually probably less than they ought to be.

34,609. Estimates of that kind probably err on the side of lowness rather than excess?—Yes.

34,610. No particular accuracy can be had on account of the difficulty of collection?—Yes, that is so at present.

34,611. Do you find any suspicion attaching to the method under which the departmental control runs small demonstration plots? Do you find any suspicion amongst the cultivators that the methods are not within their scope or that there is some particular magic about Government cultivation?—I do not think so. That used to be the case in the earlier days.

34,612. In answer to Question 10 on page 97, you raise the question of running demonstration farms on commercial lines. Of course that is a demand that has always been made on the Agricultural Department by public opinion. What class of farms can one reasonably expect to be run on commercial lines?—Of the ones that I have charge of, the smallest area is 20 acres and the biggest is about 140.

34,613. I was wondering what type of demonstration or seed farms could be run on commercial lines?—These are run as demonstration farms and they can be run on two lines of policy, (1) to make them pay to meet the wishes of our rulers, and (2) to try and give as much benefit as possible to all types of people in the district.

34,614. Would it be fair to expect an agricultural officer to make demonstration farms to pay as a general rule?—I think it ought to be confined to a very small number. It would be a feasible proposition to make one or two demonstration farms pay, but to be asked to make all demonstration farms pay is not altogether sound.

34,615. We have not heard very much good of Pusa in the United Provinces. Have you not got any good from the Mycologist in the past?—He has never attacked a problem that concerns us.

34,616. Any bacteriological problems?—I cannot say. There was that hopeful work of Mr. Hutchinson that interested me very much, but I was never able to make practical use of it.

34,617. What is your view about Pusa as a research institute with reference to the Provinces?—I think that what we should do at present is to develop provincial research.

34,618. Have you not found that some problems might benefit three or four Provinces? Let us take an example. Suppose you start an Imperial research station in rice which may be located in Madras or Bengal?—I do not think that that work is going to benefit the United Provinces for many years; probably it never will. Urgent problems such as rice improvement require tackling at once. We cannot afford to wait for some of the results which may perhaps never accrue. It should be attacked, I think, by the man on the spot.

34,619. Do you think that there is a place for Pusa if the right sort of problem is tackled?—Yes. I think it would be a mistake to do away with the present central organisation. We have got to deal with the basic problems there. But as regards crop improvement, I think those are the least basic of problems. Some of the work that has been done would have yielded better results if it had been tackled on the spot where it is of practical importance. And so I would suggest that as the line of development. In twenty years' time you would probably have plenty of room for more Imperial research work than you have at present, when, as I have said, you have realised what the basic problems are and what we have got to investigate.

34,620. Have you been a member of the All-India Board of Agriculture recently?—I was there at the last but one meeting.

34,621. You have had a good deal of experience. Do you think the Board has developed and is of any service?—I do not think it is of much practical value at present. I think that all the co-ordination that is done through the Board of Agriculture can be better done by allowing and encouraging visits to other Provinces where work similar to their own is going on. In the past such visits have not been discouraged by the United Provinces Government, but I have heard the views of people from other Provinces about it, and I have a strong impression that they were actually discouraged by not being given the necessary facilities for it. I think co-ordination for certain types of scientific work and, so far as is possible, in propaganda and demonstration can best be carried through by allowing persons to find out what is being done in other Provinces. Any one may wish to repeat in his fields the experiments that are being carried out elsewhere, and if you allow him to find out what is going on, that will bring about co-ordination better than any number of Board meetings.

34,622. You think that interchange of visits between people working on the same problem would be better than these sectional meetings?—I think so. I have thought over this rather considerably, and I would encourage a free interchange of visits. At the same time, I am not prepared to be emphatic on the matter in all its aspects.

34,623. In the case of crops, it is better to see a field experiment than to have a mere exchange of talk?—Yes.

34,624. For chemistry and entomology and such like subjects, would you consider that sectional meetings would be better?—Exactly. I think that there are certain subjects, perhaps entomology, for which sectional meetings would be better. From the point of view of Deputy Directors, I think it is better to encourage us to go to other Provinces.

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34,625. Would you remove all restrictions on the free interchange of visits?—I would encourage it in every way possible; of course not beyond certain limits.

34,626. *Professor Gangulee*: Have you got any definite restrictions?—As I said, in the United Provinces there are not, but from conversations I have had with officers in other Provinces, I have got a strong impression that there are restrictions.

34,627. We are told that the research activities at Pusa are bound to decline. What are your views on the matter?—I think relatively they are bound to decline, if you are going to encourage the Provinces to solve their own problems. As I have suggested to Sir James MacKenna, until you find out what are the basic problems, there is little room for Pusa.

34,628. You have spent some of your time in Germany?—Yes.

34,629. Did you study their research organisations?—I was interested in smaller things in those days. Of course, I have always taken an interest in the organisation.

34,630. You do not know of any centralised institutes in Germany working in co-ordination with different research stations?—There are; most of the money in Saxony was Saxon money; that was for a section of agricultural work. I believe a lot of Imperial money is also spent there.

34,631. You have spent some considerable time in Iowa?—Yes.

34,632. Did you pay any visit to Washington?—I had been to Washington, but I went merely as a sight-seer.

34,633. Turning to your own selection and plant breeding work in cotton, what is the position actually with regard to Aligarh 19? It is, I understand, obtained by selection?—Yes.

34,634. Do you see any sign of deterioration?—No, I do not think so. There is no sign of deterioration. We have always kept a seed farm specially for keeping it pure, and I do not think there is any deterioration. It is a selection from the local types, and there is no real reason why it should deteriorate.

34,635. Is there any work going on on the hybridisation of cotton?—The results of Dr. Leake's work are being sifted and finally settled up.

34,636. You are still dependent on Pusa 12 and 4 for your wheat?—In the east of the Province they do distribute large quantities of Pusa 12 and 4, but in the west of the Province they do not. We are growing a type called Muzzafarnagar.

34,637. What is the reason for that?—We find that in the west of the Province it gives a better yield. On some of my farms, I grow half and half. The advantage from Pusa wheat is that it gives a good yield, and it allows me to distribute my labour; it ripens earlier.

34,638. When did you begin your research work on rice?—I think it was begun when the Botanist was appointed, about 1921 or 1922 when Mr. Sethi was appointed.

34,639. It is perhaps one of the chief crops in the Province?—It is a very important crop. It is a big area, but it is no more important than wheat. The area is roughly about the same; and the money value is not very much more than sugarcane, if you work it out in rupees.

34,640. What were your difficulties in the way of undertaking research on rice earlier?—There were no difficulties. When research on crops was started, it was with reference to the two obvious crops of great commercial importance. Up to about 1920, you may say that no work was done on any crops, except wheat, sugarcane and cotton, merely because there was no staff to do it.

34,641. Mr. Sethi is doing rice selection?—Yes.

34,642. Where was he trained?—I really could not say; I am afraid I do not know.

34,643. Could you tell us whether he is in touch with the rice breeding station in Coimbatore?—I could not tell you that. I was officiating Director only for a very few months, and I could not tell you, but those details could be very easily obtained.

34,644. Have you got a botanical survey of the varieties of rice that are grown in the United Provinces?—That was the first thing he did. I have seen the remnants of his collection, the ones that he has not discarded. He has a very large number of varieties still growing.

34,645. Has there been any attempt to introduce new crops?—We have tried all sorts of things.

34,646. Groundnuts?—We tried groundnuts. They succeeded very well in the Province for a few years, and then they went out, due, chiefly, to white ant attacks.

34,647. Have you tried tobacco?—We grow a large quantity of tobacco in certain tracts of the Province.

34,648. Perhaps in the Eastern Circle?—Yes; but we grow a certain amount in the Western Circle, in small areas round about towns and places where manure is available.

34,649. That is not an item on which you have carried on research?—The only thing that has been done on tobacco is that we have tried the Pusa selection.

34,650. You are trying the Pusa selection?—Yes, but we have not found it very successful. The west of the Province is hard for tobacco.

34,651. Did you attend the meeting of the Board of Agriculture held at Pusa on the 7th of December last?—No. Mr. Clarke went as the provincial representative.

34,652. I was interested to find there that Mr. Clarke favoured the proposal of establishing a tobacco bureau at Pusa?—Yes.

34,653. And he said that it would be welcomed by the United Provinces Government?—Yes.

34,654. Do you think such a bureau would help the Province in tobacco investigation?—Yes. Once we are in a position to take up investigation on tobacco, I should be grateful for all the information we could get from the bureau.

34,655. You say here that most of your time is devoted to demonstration work. The main item of demonstration, I take it, is seed distribution?—Yes; that is one of the main features of our demonstration work.

34,656. Do you have any arrangement for seed testing?—Yes, germination and that sort of thing. It is laid down as one of the routine duties of every person connected with seed distribution that before the seed is given out it must be tested.

34,657. You have a large number of private seed growers?—Yes.

34,658. Do they grow seed under certification?—Quite a lot of the seed passes through our hands, and quite a lot goes direct from them to the cultivators. What we wish to do is to make them independent, dealing direct with the cultivator who wishes to sow that seed. That is our ambition. It helps us very little if all the seed that they are growing has to pass through our hands. As Mr. Clarke has stated, production and distribution must be in the hands of one agency.

34,659. How much of your improved seeds go to the small cultivator, the man farming 5 to 6 acres?—I do not think I can give you reliable information.

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34,660. My point is, are the improved varieties reaching him?—Certainly, because our system is to distribute on the basis of *sawai*, the details of which are given in Mr. Clarke's evidence. He is the fellow we are aiming to reach, and we reach him; there is no question about it. There is another thing which I have been doing as regards sugarcane of improved varieties, for which there will be a very great demand this year. In the past, only a limited amount of seed was available; we found it inadvisable to touch the smaller man. We have now got more seed than the bigger people can deal with, and there is a demand from the smaller men. I have asked Collectors if they are prepared to advance *taccavi* for the purpose, and I think the Collectors whom I consulted will be quite willing to do so, provided the money is available.

34,661. The second item for demonstration is the introduction of improved implements. Is your recommendation for improved implements based on research and necessary experimentation?—The chief implements that we are trying to introduce are types of small ploughs.

34,662. Is it the Meston plough?—Yes, and ploughs of similar type produced now in India, and the demand is increasing.

34,663. Do you get any assistance from the actual manufacturers?—We do not get much assistance from them. We are encouraging local manufacture, but the manufacturer is doing extremely little at present to distribute them.

34,664. If there is a demand, one would imagine that commercial agencies would take it up?—The demand is very widespread, and there is a certain number of local agencies.

34,665. Commercial agencies?—Yes.

34,666. You are in touch with them?—Yes. We are doing everything we can to try and get them to do their best. For instance, the Board of Agriculture gave a grant to one of these agencies to build a godown to stock the implements. We are trying to give them every encouragement of that type.

34,667. On page 97 of your note, you have told us that artificial fertilisers are at present of little importance in the agriculture of the United Provinces. But on page 26 of the Report on Agriculture in the United Provinces, it is stated: "A very few years ago very little sulphate of ammonia was used. To-day thousands of tons are consumed annually;" How can you reconcile the two?—That point really was with reference to the whole of India. If you read further, you will see that I have gone on say: "India is looked upon as a most promising market, and upcountry possibilities are being fully explored".

34,668. You were not referring to the United Provinces there?—No. The fact is that about ten years ago 2,000 tons were consumed in India, and now the consumption is something like 30,000 tons. It does not refer to the United Provinces.

34,669. We are told in other Provinces that these commercial agencies dealing with farm implements or manures do not get adequate assistance from the Departments of Agriculture?—It is too early as yet to say that in the United Provinces, and I think at present it would be quite untrue, because my experience as Deputy Director has taught me to encourage those people who relieve us of some of our work, whether as manure, implement, or seed distributors.

34,670. Now I wish to put one or two questions about your experimental farms. I think you have one experimental farm in each circle?—Yes, roughly that is correct. There are two experimental farms in some circles. The idea is to have one experimental farm in each definite tract. A circle is not a definite tract. A circle may include one or two definite tracts.

34,671. Then you have demonstration farms?—Yes.

34,672. And these are the farms that you want to make pay?—Which we are making pay.

34,673. In 1921 there was a Government Resolution stating that they should be made commercially successful?—Yes.

34,674. But I understand that these farms were not paying before that date?—They were not. Before that, they were being used as subsidiary experimental stations.

34,675. From the Administration Report I find that out of these 15 demonstration farms there are only three which are at present working at a loss?—Is that for 1926?

34,676. No, 1924-25?—There is a later report than that. At present it is only one or two, I think.

34,677. Do you publish a profit and loss account of these farms?—I can tell you as regards my own. For instance, my largest farm, on which most money is spent, is about 120 acres actual cultivation and 140 acres in all. The expenditure is Rs.12,000, and the income Rs.24,000, or just about Rs.100 under Rs.24,000. My best farms work out at an actual profit of Rs.100 per acre.

34,678. Do you yourself keep the farm costings?—We do not keep an elaborate system of costings. We keep accounts, and a profit and loss statement is published in this report.

34,679. What struck me is this. Four farms which in the previous year worked at a loss of Rs.215 made a profit of Rs.1,369 the next year?—Yes. I do not see what is remarkable about that.

34,680. That farms running at a loss one year should show a large profit another year?—My own unfortunate experience in agriculture is that that is usual. After showing a profit they may be running at a loss again. For example, this year our profits will be lower, because the prices of sugar and cotton have gone down almost 50 per cent. in some cases.

34,681. Now, coming to your demonstration plots, are these demonstration plots situated in the cultivators' own land?—Are you referring to those given in the balance-sheets? These things that are described here as demonstration plots may be better described as very small demonstration farms.

34,682. Have you seed farms besides these demonstration farms and plots?—You will find in these balance-sheets some of the farms are referred to as seed farms, but they all come under the general category of demonstration farms which have to pay.

34,683. Are they separate from the demonstration farms?—Yes, in theory; not in practice. One is the Kalai seed farm. That is the one I have just referred to, the profits of which I have just quoted.

34,684. Then you have research farms?—Yes.

34,684A. Are they different from the experimental farms?—We tried to make a distinction to some extent between research and experiment. The research is the sort of primary investigation. The experiment is the thing that the officer carries out at his field trials.

34,685. Then you have got instructional farms?—There is only one such farm, attached to the educational institute. It is the college instructional farm.

34,686. In carrying out these field trials, do you follow a particular plot technique?—It varies; for instance, take Mr. Clarke's sugarcane trials. He is working out a technique in detail and working out the probable error, and that sort of thing, but in some cases we have not advanced as

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far as that. We have gone more by judgment of yields and eye-judgment, and finally I must say you have got to accept the cultivators' word whether he thinks the thing you have given him is better than what he has got. That is the crucial test.

34,687. But in experimental work one has to be quite precise in following definite methods?—Yes. I think we are fairly precise in our experimental work.

34,688. Are you in touch with the work now being carried on by Mr. Henderson in Pusa? He has tried to develop plot technique?—I have read most of the papers that are being published on technique at Rothamsted. I have followed them fairly closely.

34,689. Not from Pusa?—I have not heard of any from Pusa recently.

34,690. Have you had trouble with mosaic disease in this Province?—It is just beginning to appear.

34,691. Have you no Mycologist here?—No.

34,692. Are you, therefore, in touch with Pusa?—They sent us an assistant last year, who went on tour for several days with me and took a lot of specimens away, the idea being to see if this really was mosaic or not. Some of the specimens he got were proved to have mosaic.

34,693. The Mycological Section at Pusa is taking up this work very seriously?—Yes.

34,694. *Mr. Calvert*: Coming back to the economic demonstration farm again, I notice the farm you mentioned just now as paying a very high profit, paid no rent?—It paid no rent; the land is owned by Government; there is also an item of depreciation which I think is given there but which is not deducted from the profits.

34,695. You mention getting a profit of Rs. 50 per acre from wheat?—Yes.

34,696. Is that after deducting all charges?—Yes, I think every charge was deducted. That was a trial carried on in the Central Circle. I think all charges were deducted.

34,697. Including rent?—Yes, I think so. I am not prepared to say definitely. I can get you those figures.

34,698. It would be interesting to have a statement showing how Rs. 50 profit from wheat was arrived at. Was that a specially selected plot?—No, an ordinary plot, where people were willing to take on this experiment. I do not think it was very extraordinary. The prices were not bad in that year. They were much better than they are now. Supposing you get 25 or 26 maunds per acre it would not be surprising. I grow 30 maunds per acre. The farm I have just been talking about grows 48 acres of wheat in a year and the average is 23 maunds. Some of it is not very good land either.

34,699. What was the Settlement Officer's estimate of the out-turn of wheat in that village?—The estimate for the whole Province was 11 maunds, I think.

34,700. The smallest of these demonstration farms is 25 acres, I think?—No, I think there are some smaller than that. One of my own which is called a demonstration farm is about 23 acres, with 20 acres cultivation.

34,701. In the Report on Agriculture in the United Provinces it is stated that the average tenant's holding in the west is about 6½ acres and in the east about three acres?—Yes.

34,702. Is anything being done to work out the most profitable method of utilising these small areas?—Not as units. We are not taking them up

as units. Our farms influence two classes of people; the big man with a similar area, and the small man, who is also interested because of the variety of crops we give him, but as a particular unit we have not started studying the small holding. When I was officiating as Director, I put up a scheme to take up this investigation by settling men who were typical tenants on typical holdings and running them as a co-operative body on about 200 acres. I do not know whether this scheme is going to be put through. My ideas on many of these things which are at present under discussion as possibilities for the future are very well described by the Registrar of Co-operative Societies in the letter sent with his evidence, in which he says: "The general conclusion that I wish to point to is that the Indian cultivator knows his own business much better than most people are willing to give him credit for; and the way to influence him is not by empty words, which go under the high-sounding names of publicity and propaganda, but by enabling him to see and to feel the practical advantages of any recommendations made." We shall never get further forward with many items now under discussion till we put them into practice on an experimental scale. My idea was to get a tract of 200 acres and settle on it about 40 tenants in an area where the average holding is about 4 to 5 acres and Government to give the supervision free and give them a programme to work to as regards cultivation, and help them to sell their stuff. It would be an interesting study in co-operative agriculture and also as a co-operative non-credit society.

34,703. These small holdings form, I understand, by far the vast majority?—We have not got detailed figures as you have got in the Punjab. We can only make deductions from our census reports, and settlement and area figures. They must be fairly numerous, we can safely say that.

34,704. Of that acreage, I understand, the greater portion is not irrigated by canal or well?—Quite a lot by well.

34,705. The majority is not?—Much is not irrigated.

34,706. On these small holdings, do you see any hope at all for the small holder?—I think the only hope is to cut down his expenditure by reducing all superfluous labour and then letting him work as a market gardener on co-operative lines. I think that is the line of development I should like to try.

34,707. Has your department done anything on a large scale for market gardening crops, say vegetables and fruit?—Yes, the garden staff is doing a lot at the various garden centres. For instance, considerable success has been achieved at Saharanpur.

34,708. You point out that for these small holders irrigation is very desirable?—Essential, I think.

34,709. That is to say, without intensive cultivation there is very little hope for the future?—None whatever.

34,710. You express some doubt as to why well construction has not developed to a still greater extent. Do you think fragmentation is one of the causes?—I think so.

34,711. Would not consolidation make the sinking of tube wells for these small cultivators an easier problem?—Yes, and all types of wells; I think that would be one of the greatest immediate advantages.

34,712. On the question of artificial fertilisers, is the cost of carriage a serious drawback to their use?—No. They are being put on the market at present at quite a reasonable rate. They are charging Rs.8-8-0 a maund for sulphate of ammonia, which works out at quite a reasonable rate for nitrogen.

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34,713. What will happen when the demand increases?—I do not know whether the prices will go up. I think the rate is an artificial one at present; but I do not think the problem has arisen yet in this Province.

34,714. Granted you have got a very large number of small holders and that you can persuade them to go in for intensive cultivation with wells, will not some form of artificial manure or fertiliser be necessary?—Yes. We are having very good results in Saharanpur with these manures in spite of only six months' propaganda. An Irrigation Officer there took a great interest in it and helped our staff considerably, and the result is that trials on potatoes and things like that in that district have been an immediate success. It has there proved to be a practical proposition already.

34,715. Is there any hope for these people through encouraging artificial farmyard manure?—I do not think so. I do not see where we are going to get the basic material from. If you can provide that, I think your problem is solved. That is the basic problem, to provide organic material to feed the soil; some sort of farmyard manure, if you like. The whole of the success of green manuring is due to the organic matter that one ploughs into the soil. If we can provide the raw material, it is all right, but I do not see any possibility of the small man doing it.

34,716. Are you actually producing artificial farmyard manure in your farms?—No, I am not.

34,717. *Mr. Komat*: I daresay you are familiar with the economic position of the cultivators in this Province?—Yes, in the west of the Province.

34,718. In the Report on Agriculture in the United Provinces, it is stated that cultivation has paid well in recent years. I suppose you confirm that statement by your own observations?—The position of the cultivator is that he has been making greater profits in recent years than he was making ten years ago, undoubtedly.

34,719. That is only a comparative statement?—Yes.

34,720. I do not know whether you are responsible for Chapter XVI of this Report, which deals with the economic position of the cultivator?—No, I am not.

34,721. But you can tell me whether you can corroborate some of the statements and figures given in table K' on page 115 with regard to net surpluses for the cultivators?—This was very fully discussed when the memorandum was drawn up, and the opinion I expressed was that the figures were slightly high.

34,722. From your experience you have reason to believe that these figures are very high?—No, slightly high, I said.

34,723. Taking Meerut Division, for instance, we are told that the nett surplus of a cultivator proprietor from an average holding would be Rs.353 per annum?—Yes.

34,724. You are inclined to think that that is rather high?—It is certainly high to-day, because since those figures were arrived at prices have fallen probably by not less than 50 per cent., and possibly in some cases considerably more. These figures must be taken for the year to which they refer; one must take into consideration the difference in prices.

34,725. But you are on the whole inclined to think that these figures are rather high?—Slightly high; that was the opinion I expressed.

34,726. *Mr. Pim*: You look forward to a great extension of well irrigation; in the area with which you are concerned, would that be much affected by the salts in the subsoil water?—No, with the exception of a small tract in the Agra district, I do not think we are suffering much from subsoil water, either from rising water level or the salts that follow from that.

34,727. It is only a limited area?—Yes; very, very limited I think.

34,728. The construction of the Sarda canal is possibly in some ways going to break new ground by introducing canal irrigation into a tract which is at the present moment fairly fully irrigated from wells?—Yes.

34,729. Is there any danger of deterioration of the standard of cultivation in those areas as the result of the construction of the canal?—I think the greatest danger is the rising water level which usually follows irrigation, particularly in a tract with a water level which already, in some districts, is extremely high; undoubtedly any substantial rise in water level will have a serious effect on sugarcane cultivation, particularly if it is followed by any accumulation of salts.

34,730. But with regard to the actual methods of cultivation, do you think there will be a temptation to be less careful?—The introduction of the Sarda canal will immediately afford opportunities for a much more thorough and intensive system of cultivation.

34,731. You consider that any changes of cultivation that would result would be for the better?—Yes, the immediate effect of the introduction of the Sarda canal will be to improve cultivation.

34,732. *The Chairman*: I think you heard what the Director of Agriculture told the Commission yesterday as to his views in connection with the possible future of Pusa as a centre of post-graduate teaching?—Yes.

34,733. Have you any opinion in that connection that you would like to express?—I think we must look to a central institute of the nature of Pusa for some of our future recruits to the Agricultural Department. A type of man can be chosen for higher training at Pusa. Men of our department, for instance, could be sent there for a course in agriculture.

34,734. What do you think would be the ideal scheme of education for an Indian Deputy Director in the future?—I would be inclined to suggest two types; I think it would be a mistake to close recruitment to outside sources, to people educated in Europe. I should also like to see an equal number of men whose training has begun in this Province; I think promising young men from our Subordinate Agricultural Service and the better type of provincial officers could be picked out and sent to Pusa. I think both lines of recruitment are advisable.

34,735. Would you suggest that a certain amount of study abroad would be a qualification for these higher posts?—Yes, if you are going to exclude men the whole of whose training has been abroad; but if you are going to allow that element to come in, I think training at Pusa after taking an agricultural or scientific degree would give us the men we require.

34,736. *Professor Gangulee*: Would you affiliate Pusa to any University?—Yes, I rather think I would; I think the sentimental value of a degree is worth something.

34,737. Would you confine it to the M.Sc. degree, as was suggested by Mr. Clarke?—I should be inclined to confine it to something corresponding to the M.Sc. I think there is room for Pusa as a research institute in addition to being a teaching institute.

34,738. *Sir James Mackenna*: The suggestion of sending officers for training in England or Germany is limited to Deputy Directors?—Yes.

34,739. Would you recommend sending a Chemist or a Botanist to Cambridge?—Yes; we are sending some men Home for special training.

34,740. *Sir Thomas Middleton*: What is the minimum length of college or University training which you would regard as necessary for a man who is hoping later in life to be a Deputy Director? Would you say nothing less than a four-years' course?—Yes, I should say nothing less than a four-years' course.

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34,741. Had you any training in agriculture before you went to Edinburgh?—No, but I came from a farming family.

34,742. After leaving Edinburgh you went to Leipzig?—Yes.

34,743. How long did you remain there?—Two years, roughly.

34,744. Then you were at Iowa?—Yes.

34,745. So that you had altogether six years?—Yes.

34,746. Do you think it is possible to get the general knowledge of agriculture that one desires in a Deputy Director in less than five or six years' training?—I do not know that I am prepared to answer that question offhand; it seems a long time.

34,747. I think four years is the normal college course in some of the Indian colleges, is it not?—Yes.

34,748. So that, your proposal of a post-graduate course at Pusa would make it five or six years?—It would be six years at least; I do not see how one can get out of it. If men are to be recruited from our Agricultural College, and I think it is very desirable, I think it must be that length of time.

34,749. Is it not the case that a wider training is probably required for the post of Deputy Director than for any other type of work in the Indian Agricultural Department?—It requires a very wide training; a Deputy Director has to tackle a great variety of subjects, very often in a non-technical way.

34,750. It also requires a considerable amount of experience?—Yes, the wider his experience the better. Of course, what happens usually in India, and it is very difficult to see how we can avoid it, is that young men are brought out and put straight into harness. I think it would be a great advantage if they could be trained, but at the same time that is very difficult. The only way they can be trained is by a senior officer on the spot; it seems to me that is all that can be done.

34,751. In the event of a young Indian graduate coming from such an institution as you have suggested, Pusa, for example, how is he to get the experience?—He would be trained by a provincial department, we will say, as a junior Provincial Service officer, or in any case, as a Provincial Service officer, and he would be put under a senior Deputy Director to get his experience in the department in circle work. I think that is the scheme that has already been put forward by Mr. Clarke, and we are hoping to recruit two or three of that type this year.

(The witness withdrew.)

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Replies to the Questionnaire.

QUESTION 2.—AGRICULTURAL EDUCATION.—(i) No.

(ii) Yes, in many districts. As far as I know there is only one agricultural school at Bulaudshahr, and it is evident that it cannot meet the requirements of these Provinces. I am of opinion that at least one similar school should be opened in every agricultural circle in the districts which may be most advanced in agriculture.

(iii) Not necessarily, but preference should be given to teachers drawn from agricultural classes.

(iv) Yes. The question for stimulating the demand does not arise in these Provinces because the demand is far in advance of the supply.

(v) Service.

(vi) Not necessarily.

(viii) I am in favour of: (a) Nature study; (b) school plots; (c) school farms.

(ix) Mostly Government service.

(x) By making more room in the Government service through the expansion of the Agricultural Department, and making agriculture as a profession more profitable than other callings.

(xi) I do not see any such movement.

(xii) By creating a belief in the success of the modern methods of agriculture and making facilities for learning them; both these objects would be achieved by means of successful demonstrations.

(xiii) The agricultural institutions in rural areas should be administered and financed by the District Boards and the Government.

QUESTION 3.—DEMONSTRATION AND PROPAGANDA.—(a) Encouragement to landlords to open and carry on successful demonstration farms on the lines best suited to the conditions of the locality.

(b) By encouraging and assisting tenants to open and carry on successful demonstration fields on lines best suited to the conditions of the locality.

(c) After establishing demonstration farms and fields as stated in (a) and (b) and thereby creating a belief in the success of the new methods, encouragements, namely, cheap credit, concession rents, improved seed and the provision within easy reach of suitable implements and their parts would induce the cultivator to adopt expert advice.

(d) Regarding the success of the demonstration work I would mention my own agricultural farm, as also referred to in the answer to this sub-clause by the British Indian Association of Oudh, which has yielded a net profit of 75 per cent. in the year ending 30th June, 1926.

QUESTION 5.—FINANCE.—(a) At present the agriculturists are labouring under great difficulties for want of means to obtain financial help for agricultural operations on suitable terms. It is very desirable that short and long-term credit may be provided for them. More extensive introduction of co-operative credit would be useful.

(b) I am not much in favour of the Government system of *taccavi* simply because the cultivators are put to much harassment both at the time of obtaining and repayment of *taccavi*.

QUESTION 6.—AGRICULTURAL INDEBTEDNESS.—(a) (i) The main causes of borrowing are:—

1. Unthriftiness of the cultivator.
2. Unstability and uncertainty in the return of agricultural produce.
3. Low percentage of profit, and
4. Seasonal calamities.

(ii) The sources of credit are the village moneylender, co-operative credit where the societies exist, and *taccavi* advances made by zamindars and Government.

(iii) The reasons preventing re-payment are the same as stated in the answers to the above clause (a) (i) sub-clauses 1, 3 and 4.

(b) Unless the cultivators themselves become sufficiently intelligent to guard themselves against indebtedness, no artificial measures are expected to succeed in saving them from ruinous debts. In this respect it is extremely desirable that better provision should be made for the education of cultivators in order to make them realise the dangers of indebtedness.

(c) Yes.

QUESTION 7.—FRAGMENTATION OF HOLDINGS.—(a) The best means to prevent the fragmentation of agricultural holdings are the introduction of suitable village industries in order to divert the energies of a considerable section of

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the population towards them and to prevent the rush on land of those who have no other source of livelihood.

(b) The obstacles in the way of consolidation are many and various, and the practical difficulties in their way make them unsurmountable.

QUESTION 10.—FERTILISERS.—(a) Yes, by preserving manure according to the latest system and popularising fertilisers suited to the different soils.

(c) By means of demonstrations.

(f) The use of cowdung as fuel could be discouraged if a desire for intensive cultivation were created in the cultivator and a supply of some other fuel as cheap as cowdung were made available as a substitute.

QUESTION 11.—CROPS.—(a) (i) The improvement of existing crops can only be effected by means of intensive cultivation and selected seed.

(ii) Introduction of some fodder crop is extremely desirable.

(iii) Selected seed should be distributed as widely as possible and preference should be given to approved cultivators.

QUESTION 14.—IMPLEMENTS.—(a) As regards the introduction of new agricultural machinery, I would first of all urge the importance of a suitable harvesting machine to separate the grain from the straw and to make the straw into a good chaff fit for the use of the cattle; the present method practised by the cultivator is most tedious and wasteful as far as the time of the cultivator and the strength of his cattle is concerned; the operation takes place during the hottest part of the year and it renders the cattle exhausted and footsore and they are quite unfit for ploughing which begins soon after the harvesting is completed; consequently the agriculturist has to suffer a considerable economic loss on this account.

(b) I think supply on the hire system would go a long way to hasten the adoption by the cultivator of improved implements, in the areas where the demonstrations have created a demand.

QUESTION 16.—ANIMAL HUSBANDRY.—(a) (i) In order to improve the breed of bullocks, it is desirable that the Veterinary Department should take upon itself to castrate the country bullocks in the areas where it may be possible, to supply Government bulls of good breed either to the co-operative societies, to landlords, or to some other institutions which may maintain them.

(c) The shortage of fodder is usually most marked during the months of January and February and the scarcity exists for about six weeks.

(e) With an increase in the interest taken in agriculture in general, and intensive cultivation in particular; by the methods suggested in these answers and particularly in the answer to Question 25 (a), the cultivator would begin to take a keener interest in branches like the one dealt with here, namely animal husbandry.

QUESTION 17.—AGRICULTURAL INDUSTRIES.—(a) As a rough estimate, I would say that an average cultivator is required to work on his holding for about 275 days during the year and for the rest of the period he is either busy constructing or repairing houses, huts and walls and attending to social and religious engagements.

(b) I should think that yarn spinning, rope-making, and basket-making would make good subsidiary industries to occupy the spare time of their families provided the outturn fetches a reasonable return.

(c) I see no obstacles in the way of expansion of such industries as bee-keeping, fruit-growing, sericulture, pisciculture, lac-culture, rope-making, basket-making, but there will be some religious and social obstacles in the way of poultry-rearing by the Hindus.

(d) Yes.

(f) Yes.

(h) It is difficult to suggest means to this end unless the people are educated in the principles of hygiene.

QUESTION 18.—AGRI CULTURAL LABOUR.—(a) By means of attractive terms.

QUESTION 20.—MARKETING.—(a) The market facilities are not at all satisfactory as far as the improvement of agriculture is concerned, because little or no value is attached to the quality or the purity of the grain. I am speaking of the markets in Rae Bareilly district, including the city, but I do not think there is any marked difference in the markets of other districts of Oudh or Agra generally from those I am speaking of. This I consider to be one of the chief causes for the indifference of the cultivator towards the quality and purity of his produce.

(d) Such information will be very useful provided it is authoritative.

QUESTION 22.—CO-OPERATION.—(a) An organised effort to improve agriculture in general and methods of cultivation in particular will be the best encouragement for the growth of the co-operative movement, for I think the co-operative societies will be one of the chief factors in any such scheme; I have made my suggestions in this direction in answer to Question 25 (a).

QUESTION 23.—GENERAL EDUCATION.—(a) The general education that is given in our schools and villages has no bearing upon the agricultural efficiency of the people; rather, on the other hand, it detaches their interest from the agricultural industry.

(i) I would suggest that compulsory agricultural education should be given in primary schools in the rural areas.

(ii) There should also be provision for agricultural education in the middle and secondary schools but there it may be made optional.

(iii) As far as higher agricultural education is concerned, I would not mix it up with general education.

(b) (i) Good and compulsory agricultural education would bring this result in the rural areas.

QUESTION 24.—ATTRACTING CAPITAL.—(a) In order to induce men of capital and enterprise, it is of the utmost importance to prove that large farms worked by machinery are capable of yielding as much profit as, if not more, than the farms of medium size worked by bullock power under the existing systems of cultivation; I say large farms because I think men of capital and enterprise would not be very enthusiastic in investing money for a small amount of profit, even if the percentage of profit may be fairly high. I further suggest their working by means of machinery, for I think it will not be possible to obtain labour for a large farm worked by bullock power unless one pays very high rates, which would ultimately reduce his own profit to a considerable extent and cause great loss to, and much annoyance amongst, the neighbouring cultivators by the general rise in labour rates of that locality.

I would therefore make the following suggestions:—

(i) That at least one demonstration farm, equipped with up-to-date machinery, should be opened by the Government in these Provinces.

(ii) Necessary advice, assistance and encouragement may be given to men of capital and enterprise who may apply to open similar farms, in the shape of: (1) loans on easy interest and reasonable terms to persons who own land but do not possess enough cash; (2) land to those who possess cash but are not big landowners; (3) expert advice and men on deputation to guide the work unless the farmer is enabled to make his own arrangements; (4) supply of good seed; and (5) assistance in the disposal of farm produce on the best available terms to be had in the country.

(b) Lack of enterprise and uncertainty of receiving good returns are the chief amongst the factors that discourage landowners from carrying out improvements.

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QUESTION 25.—WELFARE OF RURAL POPULATION.—(a) A large majority of the rural population being agriculturists, it needs no argument to support the contention that the prosperity and well-being of the rural population depends chiefly on the improvement of agriculture; and in order to obtain a general improvement in agriculture it is of paramount importance to effect a change in the present indifference of the cultivator into a desire for intensive cultivation, and his conservative persistence in old and wasteful methods into an appreciation of new and improved methods of cultivation. I am of opinion that satisfactory success can be achieved in this direction by means of demonstration, propaganda, encouragement and assistance:—

(i) Regarding demonstration work, I would like to suggest the following scheme:—(1) that the Government should open one model demonstration farm in every district, and this farm should be worked according to modern methods of cultivation that could be practised by an average cultivator; (2) landlords and tenants may be encouraged and assisted to open village demonstration farms on the lines of the model demonstration farm stated above; (3) cultivators possessing small holdings may be induced to open smaller demonstration farms on similar lines called demonstration fields; and (4) still poorer cultivators who choose to avail themselves of the concessions suggested here may be allowed to open still smaller farms called demonstration plots.

(ii) The following will be some of the means of propagating the above scheme:—(1) in every district where model demonstration farms may exist agricultural exhibitions should be held according to the needs and convenience of the population, and special opportunities may be afforded to the cultivators to compete in them; (2) representative district committees may be constituted to manage exhibitions and co-operate with the Government in the propagation of the above scheme; and (3) in order to derive the benefits of co-operation and in view of further propagation of the above scheme amongst the village people, village societies may be formed in the villages by the aid of the district committees and the co-operative societies may be incorporated with them, if possible.

(iii) The following are some of the encouragements that would go a long way to induce the cultivator to open any of the above demonstration farms that suits his convenience and resources:—(1) advance of loans on cheaper rate of interest and convenient instalments; (2) supply of selected seed at a cheaper rate of interest and at a place as near their holdings as possible; and (3) supply of implements and parts at attractive rates on hire as well as on sale.

(iv) The following assistance would be indispensable to a farmer:—(1) good communications from holdings to the market place; (2) satisfactory market facilities in order to enable the cultivator to obtain the best price for his produce; and (3) establishment of village industries to utilise the spare time of the cultivator.

I am aware that the above is but a rough outline of a scheme and that a number of suggestions embodied in it have been dealt with in answers to the various questions of this Questionnaire, but still I think that the suggestions put together, in not even a very methodical way, may be of some use to the Royal Commission while considering this most important subject of the well-being and prosperity of rural population.

(b) Yes.

Oral Evidence.

34,752. *The Chairman:* Raja Jagannath Baksh Singh, we have your note of the evidence which you wish to give before the Commission. Is there anything that you would like to say at this stage or may we ask you some questions?—I have nothing in particular to say.

- 34,753. Are you a landholder?—Yes.
- 34,754. Could you give us the extent of your estates?—My estate consists of twenty villages.
- 34,755. Do you farm yourself?—Yes.
- 34,756. On your home farm?—Yes.
- 34,757. On irrigated or unirrigated land?—Irrigated land.
- 34,758. What are your principal crops?—Wheat.
- 34,759. Do you carry out anything in the nature of experiments?—No.
- 34,760. You have not any experimental farm?—No, I have not got anything like that, only demonstration farms.
- 34,761. It is a system under which an arrangement is made between the Agricultural Department and yourself?—There is no particular arrangement. I am carrying on my demonstration farms on the lines practised by the cultivator.
- 34,762. Are you multiplying and distributing seed of improved varieties?—I sell my produce to the department and they distribute it. I do distribute seed myself but that is not improved seed, and it is not done on any general scale. If any particular tenants want improved seed I give it to them, but most of my produce is sold to the department.
- 34,763. Are you growing any sugarcane at all?—I used to grow some, but I did not find it profitable.
- 34,764. How do you account for the fact that it was not profitable?—I found two defects with regard to that: one was that my place was not a sugar producing tract, and the other was that the process of making *gur* was very tedious and wasteful. I could not sell my crop to any factory and I found that it was not successful. Wheat was more successful than sugarcane.
- 34,765. Do you apply manure or fertilisers to your wheat land?—Yes, I do.
- 34,766. What do you apply?—Nitrate of soda, to selected plots and selected fields; and cow-dung in all. I have got a block where I apply manure and another which is unmanured. In the manured block I mostly put cow-dung manure, but in selected fields, I give nitrate of soda.
- 34,767. You have one block which is never manured?—Yes.
- 34,768. Could you tell the Commission how the profits on these two blocks compare?—I have not calculated the profits but I can tell you the yield. My average yield on the unmanured block is about 10 maunds per *pucca bigha** which comes to about 16 maunds per acre, while on the manured block the yield is 16 maunds per *pucca bigha* which comes to about 24 maunds per acre.
- 34,769. And that difference is enough to cover the cost of the fertiliser and leave you a margin of profit?—I have not calculated as to whether it is enough, but I think it would be.
- 34,770. Do you notice any progressive deterioration in the unmanured land?—I have not found that to be the case. I find the average is increasing.
- 34,771. Is there any plant food in the water that you use for irrigation? Is there a certain amount of silt?—No, the unmanured block is clayey soil while the manured block is sandy soil.

* A "pucca bigha" is, roughly, $\frac{1}{3}$ th acre.

34,772. But it is in the unmanured block that you see a great deal of improvement?—I find improvement in both. I have made no comparison.

34,773. I was wondering whether the water that you put on to your land accounts for this improvement?—No.

34,774. Presumably then it is due to the good tillage?—Yes. I irrigate the unmanured block from a big tank.

34,775. So that it is not likely that there is much silt in that water. That would be deposited in the bottom of the tank?—Yes.

34,776. I would like to ask you about cattle. How many pairs of working bullocks do you yourself keep?—I have got twenty pairs.

34,777. Do you find the fodder problem acute in certain seasons?—Very acute.

34,778. Are you making any experiments to meet that difficulty?—I wanted to know if Government has got any successful crop to introduce.

34,779. Have you been to their stations to have a look at what they are doing?—Not with a view to find out a successful fodder crop.

34,780. Do you keep any milch cows at all?—Yes, for domestic purposes only, but not on dairy lines.

34,781. Have you tried the silo at all for preserving fodder?—Yes.

34,782. What is your experience?—It is quite good. When the cattle are accustomed to eating it, it gives good results. It takes time for them to get accustomed to it and at first they do not eat it readily.

34,783. It rather depends on how it is made?—Yes, if it is not in good condition the cattle will not eat it.

34,784. And also if it is really well made they take to it readily, whereas if it is sour they take a long time?—Yes.

34,785. Now to turn to the substance of your note: Are you familiar with the school at Bulandshahr?—Not very familiar with it as it is at one end of the Province and I have not visited it.

34,786. You form the view, I understand, that there is a growing demand for agricultural education?—Yes.

34,787. Do you think that the cultivators in your villages are beginning to demand better education in the most general sense for their children?—Yes.

34,788. Do you notice a difference in the last five or ten years?—Yes.

34,789. Do you think opinion is on the move?—It is; there is a rush for admission into the schools.

34,790. Bearing in mind that the Agricultural Department has only been some twenty years in existence and that a long war has intervened, I should like to ask whether you are, on the whole, satisfied with the progress that has been made?—No.

34,791. You think more might have been done?—Yes.

34,792. With the money that has been spent, or do you think that more money should be spent?—More money should be spent.

34,793. May I ask you to turn to page 132? In answer to Question (3) (d), you refer the Commission to an answer by the British Indian Association of Oudh?—Strictly speaking, I do not represent the British Indian Association. I am here as a farmer.

Raja Rampal Singh: The answers of the Association are with me, and I shall send them in.*

* Not printed.

34,794. *The Chairman:* In answer to our Question 5 (b) on the same page 132, you say: "I am not much in favour of the Government system of *taccavi* simply because the cultivators are put to much harassment both at the time of obtaining and repayment of *taccavi*." Take the point in its component parts, firstly at the time when the application was made. Do you think that the inquiries made were unreasonably detailed?—That is also a factor which creates delay in payment.

34,795. But do you suggest that these inquiries are too complicated, that they should not be carried on as they are carried on at the moment?—They should be more speedy.

34,796. How about the harassment at the time of repayment?—My experience is that the persons who go to collect the money try to collect it at a period when the tenant is not in a position to pay, and naturally he would like to defer payment at that time.

34,797. Do you mean that the loans are collected at a particular season which is inconvenient?—In some cases it is so. I am simply pointing out this as one of the ways of harassment.

34,798. Do you not think that one of the real difficulties is, that in lending public money and in collecting repayments of public money, a certain strictness is inevitable and that that is necessarily unattractive to the cultivator?—I had considered that point, but I think when the Government is lending money, it is acting like a creditor and the principles of a creditor can only be successful as far as the Government is working as a credit department.

34,799. You mean Government is in competition with the moneylender and that the cultivator prefers the way of the moneylender?—Naturally.

34,800. Although those ways may mean an appearance of kindness at the time, but anything but kindness in the long run?—Exactly.

34,801. You give, on the same page, in answer to Question 6, as the sources of credit the village moneylender, co-operative credit where the societies exist, and *taccavi* advances made by zamindars and Government. Is the practice of lending cash to tenants widespread amongst landlords in this Province?—I think it is fairly widespread.

34,802. What is the usual rate of interest charged?—From 12 to 18 per cent.

34,803. Have you any co-operative societies on your estate?—There are in some of the villages.

34,804. What is your view of the state of these societies?—They are not very popular.

34,805. Do you know at what rate of interest they are lending?—I do not.

34,806. With regard to fragmentation of holdings, in answer to our Question No. 7 (a) the best means, you say, to prevent the fragmentation of agricultural holdings are the introduction of suitable village industries in order to divert the energies of a considerable section of the population towards them. Have you there contemplated these village industries being taken up as a whole-time occupation by a proportion of the population?—Yes.

34,807. So that your idea is that, on the death of an owner, some of his sons might be engaged in these occupations and would therefore not be anxious to take up any land?—Yes.

34,808. Are you yourself making any experiments in the way of improved implements?—No, I am not making any experiments in that direction.

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34,809. Are you using any power cultivation?—No. I used pumping plants, oil engines.

34,810. To lift from wells?—Yes, and also from tanks.

34,811. Have you yourself sunk many wells?—Yes.

34,812. How many approximately?—I have not calculated the number, but it would be about twenty.

34,813. Have you had a high percentage of successes?—Yes, fairly high.

34,814. Have you had any failures with your bores?—Yes, some failures.

34,815. Do you find that the supply of water from these wells is more or less even over your estate, or does one well vary a good deal from another in that respect?—It depends upon the tract of land. In clay it is generally high, but in sandy soil it is low.

34,816. Do you know the output of your best well in gallonage?—For my best well I used a suction pipe of 4 inches and a delivery of 3 inches. The capacity of the pump was 14,000 gallons per hour.

34,817. Could you keep up that supply of 14,000 gallons per hour, or did the well give way or dry up?—To a certain extent it gave way, but there was a point where the supply was steady.

34,818. How many acres were you able to work with that supply?—About 70 *bighas*; that is the area of the block in which the well is situated.

34,819. Are you breeding any of your working cattle yourself?—Yes, I have a small cattle farm.

34,820. What bulls are you using?—I have lately indented for a Hissar bull. I had one Ponwar bull first and then I had a Kherigarhi.

34,821. From the Government farm?—Yes.

34,822. Have you had success with it?—The Ponwar was better; the Kherigarhi has not been successful.

34,823. What quality of cows did you use?—Indigenous.

34,824. Of what breed?—It is an indigenous mixed breed.

34,825. On page 133, with regard to agricultural industries, you express the view that the average cultivator works for about 275 days in the year, and out of the remaining 90 days he is either busy constructing or repairing houses, huts and wells or attending to social and religious engagements. Do I understand that it is your view that he may usefully employ some of that time in augmenting his income by some spare-time occupation?—Yes.

34,826. Have you any suggestions as to how such spare-time occupations might be encouraged amongst the cultivators?—There are a number of spare-time industries suggested in the Questionnaire, and I think they are good.

34,827. I take it that some steps would have to be taken to encourage cultivators to go in for those?—Yes.

34,828. You touch a very important point on page 134, in answer to our Question 20 on marketing, and you point out that one great flaw in the market facilities in the districts that you are familiar with is that no value is attached to the quality or the purity of the grain. Have you any suggestions for improving that position?—I think at present the department should arrange to purchase good wheat.

34,829. You do not think there is any hope of bringing about any change in the market which would assure to growers of improved varieties, who marketed those varieties pure, a reasonable price for the quality?—Not to begin with.

34,830. Where do you market your own wheat?—I have said just now that I sell it to the department.

34,831. Do you contemplate giving children of the primary schools any vocational education?—I contemplate elementary agricultural education in the primary schools.

34,832. You do not think that literacy is the great desideratum in an elementary system?—It is.

34,833. Do you not think that there is the danger that, if you superimpose this vocational course, you may prejudice the cause of literacy? Is there enough time to teach these small children to read, to write and to do arithmetic, as well as to teach them some of the elements of agriculture?—Most of the students being sons of agriculturists, it will not take much time to divert their interest towards agriculture.

34,834. Do you go in for any detailed system of accounting on your farm?—I have got some accounts here with me.

34,835. I was wondering whether you could give us the figures of your gross and net profits on the wheat land for any series of years. If we could get information from you, it would be valuable, because it would give us an opportunity of comparing the profits of a large scale farm with those of a small farm?—I have not got figures for several years, but for this year I have got some figures.

34,836. Could you trust us with those?—I should be very glad to supply the figures if I get the form in which you want them.*

34,837. *Sir James MacKenna*: On page 133, you recommend the introduction of agricultural machinery, citing the particular case of a suitable harvesting machine. Do you recommend the introduction of machinery because labour is becoming scarce in the neighbourhood?—No, but because it is very exhausting to the bullocks.

34,838. In this particular case you quote the reason, which is new to me and it is important. What will happen to the labour that is displaced by the introduction of machines of the kind you mention? What will they do? It will take less men to run this machine than under the old methods of threshing?—These machines will not create any excess of labour.

34,839. You think they will find other jobs to do?—Yes, because no labour is required in threshing *bhusa*; it is the bullocks which do it.

34,840. Would you recommend the introduction of machinery in places where there is an adequate supply of cheap labour?—Provided it is not more costly. I would recommend machinery, if it is profitable to use it.

34,841. You have got a supply of cheap labour?—Labour is not scarce in Rae Bareilly.

34,842. Have you tried Pusa wheats on your estates?—Yes.

34,843. How do you find them? Are they good?—Yes.

34,844. Are they good in comparison with the local varieties?—Yes.

34,845. What would be the percentage of increased out-turn?—I do not possess the figures.

34,846. Would you say that they are 30 per cent. better in out-turn?—I have never tried them on a field side by side with other varieties.

34,847. You have not compared them. You think they are distinctly better?—I think they are distinctly better.

34,848. When did you start your home farm?—I have been doing farming for the last twenty years or so, but the system of accounts that I now have and the methods that I follow at the present time have been in practice for the last ten years.

* Not received.

34,849. There was a great revival of interest in agriculture amongst the talukdars about ten or fifteen years ago?—Yes.

34,850. Instead of letting out all the land for cultivation, they started their own home farming?—Yes.

34,851. You were actually interested in agriculture before that general movement took place?—Yes.

34,852. *Professor Gangulee*: What is the method of paying labourers' wages?—In cash and also in kind.

34,853. How much cash?—It varies from 1½ annas to 4 annas. They are paid in kind only for the harvesting operation, at the rate of a seventeenth part of the grain which one collects.

34,854. I understand you get most of your labourers from your twenty villages?—Yes, almost all.

34,855. These villagers do not possess land of their own?—Some of them have land, but a few of them have not enough land for their cultivation.

34,856. Are you connected in any way with the District Boards?—I was.

34,857. Could you tell us what is their view with regard to agricultural education or education in rural areas?—I do not know what their views are, but practically I see no sign of their activity on the rural side.

34,858. What are their chief activities?—Primary education.

34,859. Do they assist the Department of Agriculture in any way in their demonstration work?—I do not think the Rae Bareilly District Board in any way help the Department of Agriculture.

34,860. Their chief activity is primary education?—Yes, primary education and communications.

34,861. What is your view on the question of fragmentation of holdings? Is it a serious handicap to agricultural improvement?—I think it is.

34,862. Have you given any thought to the matter, as to how you would bring about consolidation?—Do you mean consolidation or preventing fragmentation?

34,863. How could fragmentation be stopped?—I have suggested that some suitable industries should be encouraged. I also think that it would be better to have some legal measures taken. For instance, the law of inheritance amongst the cultivators may be amended.

34,864. What are the views of the landlords of this Province in regard to the problem of fragmentation of holdings? Do you think they would be in favour of legislative measures to check the evil?—My reply to that is not given as representing the view of the landlords, but I personally think that fragmentation should be avoided as far as possible.

34,865. You think it could be done only by legislative measures?—Yes, and by introducing other suitable industries or other callings.

34,866. You talk about improved implements. What are the implements you are thinking of?—Ploughs.

34,867. Better ploughs?—Yes.

34,868. Iron ploughs?—Yes.

34,869. You are introducing iron ploughs?—I am using iron ploughs.

34,870. You have no difficulty in getting suitable draught cattle?—No; there is no difficulty at all with the Meston plough.

34,871. Have you taken any interest in the co-operative movement?—Not much; I never thought it was very successful or well organised, unless the organisation came from the top.

34,872. There are no societies in these twenty villages under you?—There may be a few; I was told they were formed, then liquidated and then formed again; that is what I heard. There were no stable societies with any reputation behind them.

34,873. You yourself have not taken an interest in this movement?—I am not an expert in co-operation and I have not taken much interest in it.

34,874. Would you engage the services of a graduate of the Agricultural College to look after your farm?—Provided he is interested in agriculture.

34,875. Naturally a graduate from the Agricultural College would be interested in agriculture?—I doubt very much whether in the majority of cases they are.

34,876. *Sir Ganga Ram*: Have you tried one?—No, I have not yet tried one. My experience of those I have met is that they prefer Government service to agriculture.

34,877. *Professor Gangulee*: Has it been your experience that the graduates turned out by the Agricultural Colleges are not interested in agriculture?—That is not my personal experience; that is my general knowledge.

34,878. Have you at any time paid a visit to Cawnpore Agricultural College?—I did, a short time ago.

34,879. Where did you meet the graduates of these Agricultural Colleges?—In Lucknow. I am not particularly referring to graduates of the Agricultural College, but to students who have passed through the agricultural courses.

34,880. You formed the view that they are not sufficiently interested in agriculture?—I think most educated persons are not interested in agriculture as a profession.

34,881. *Mr. Calvert*: Would you feel inclined to venture an opinion as to whether rural debt is increasing?—It is difficult to say that off hand.

34,882. Is there any other outlet for the capital of the moneylender apart from moneylending?—Yes, he can go in for agriculture himself.

34,883. Could he get the land?—Yes, he could purchase it.

34,884. But, apart from that, is there any other outlet?—He could invest it in other industries.

34,885. Why do not they invest in other industries?—As long as they can invest their money in business near their homes and get sufficient profit, they do not like to go in for other industries.

34,886. That is to say, they like to invest their money near their own homes?—And at a good profit.

34,887. *Professor Gangulee*: At a high rate of interest?—Yes.

34,888. *Mr. Kamat*: In this Province what are the relations generally between the zamindars and the tenants? Are they improving of late?—They are improving.

34,889. Do you think recent legislation has helped to bring about this improvement?—Yes.

34,890. *Professor Gangulee*: To what legislation are you referring?—The Agra Tenancy Bill and the Oudh Rent Act.

34,891. *Mr. Kamat*: As a rule do the zamindars take any serious interest in agricultural improvements and reforms?—Yes, they are beginning to do so; there is considerable improvement.

34,892. You mean they are taking greater interest of recent years?—Yes.

34,893. Or is it only since the appointment of this Commission?—No.

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34,894. The improvement is of longer standing?—Yes, I think so; I do not think the appointment of the Commission has affected it at all.

34,895. Do you agree that the zamindars are in a position to carry out a good many agricultural reforms if they have the will to do so?—If they have the will and advice.

34,896. That is exactly what I wanted to ask you about. What are the difficulties in the way of improvement? Are you in touch with the Agricultural Department, or are there other difficulties?—But the Agricultural Department itself is not in a position to give us any particular advice.

34,897. You find the Agricultural Department is not in a position to give you advice?—No, they are doing the same as the cultivator is doing.

34,898. You really mean that the various demonstration farms that the department has started, and the seed stores of which we read in this memorandum, have not helped the zamindar class?—No. The demonstration farms and the seed stores are two different things. The demonstrations have not yet created a belief in their success in the population, while the seed stores were only established a year or two ago.

34,899. Do you consider that on the whole the activities of the Agricultural Department have not affected the zamindar class?—They have not affected it considerably. In what way do you mean it has been affected?

34,900. In creating a greater interest on their part in the matter of agricultural reform?—They have.

34,901. We have been told that as a result of the system of making demonstration farms a commercial success, no less than 500 private farms have been opened, and, similarly, capital may be attracted owing to the system that the department has introduced. Do you not regard that as an indication that the department is useful?—It is very useful; I do not say it is not useful; but I think much more could be done.

34,902. Apart from the advice which you seek from the department, are there any intelligent zamindars who of their own initiative could introduce reforms, for instance, in regard to cattle breeding and the use of machinery?—They can, of course, with regard to cattle breeding, but there is hardly anyone who can introduce machinery unless they get good reliable expert advice. There are some zamindars who would like to go in for machinery, but they are hesitating because they are afraid it might fail and cost them a lot of money.

34,903. So that there again you feel that you lack technical advice?—Yes.

34,904. And if that technical advice were available, zamindars would go in for new implements and machinery, and might perhaps even hire them out for the benefit of their tenants?—I think so.

34,905. You think that is quite possible?—Quite.

34,906. What is hindering the zamindars from approaching the department concerned for technical advice? Is it their apathy or the apathy of the department in giving that advice?—To a certain extent both.

34,907. I want to know whether the zamindars have evinced a desire to approach the Agricultural Department, or are they rather indifferent about it?—From the zamindars' point of view, I have not yet ascertained how many of them have approached the Agricultural Department; and from the Government side, I have not yet seen what particular advice is being advertised or popularised.

34,908. You said that judging from your general knowledge, you have not very much faith in the agricultural graduate?—No, I did not mean to say I have not much faith; I mean to say that no particular interest

in agriculture as a profession is created in them by the training they receive. I do not say that I have no faith in the graduates of the agricultural colleges.

34,909. If you have faith in the agricultural graduates, why is it that the zamindar class is not utilising the services of men trained in the agricultural colleges?—Because they think trained men will cost more and will not show any proportionate results.

34,910. They are afraid of the market value of the trained man; is that one of the difficulties? Is the difficulty that they are afraid they will not be able to afford the high salary of these trained men?—One point is that they will have to pay more and that the men will not be able to produce any proportionate results. I think I am quite clear in my reply.

34,911. That virtually means that you have no confidence in their knowledge?—Not that, but I do not know what they will do.

34,912. *Professor Gangulee*: Perhaps the difficulty is that you have no faith in their efficiency?—Judging from our experience of the demonstration farms carried on by Government, I do not see what these graduates can do in particular. I have always been told up to now that these Government farms have not been successful generally, though a few of them have been obtaining good results and a few were making good profits. If the Government demonstration farms are not any very great success, I do not know what better results the graduate will bring on private farms.

34,913. In the first place you say that the demonstration farms are not a success, and, in the second place, men trained on the Government farms would not be of very great value to you?—Economically, yes. They might do well on large farms, but there are no large farms.

34,914. Bigger zamindars can cultivate large farms?—Yes, they can have large farms, but how will they manage them?

34,915. Surely there must be any number of big zamindars who could take up all the graduates turned out by the agricultural college?—Yes, if their farms are worked by machinery.

34,916. I mean there is no shortage of big zamindars as compared with the number of students coming out of the colleges. Is it a mutual lack of confidence which is at the root of the difficulty?—I do not think there is any lack of confidence generally prevailing among the zamindars with regard to these graduates.

34,917. With reference to spare-time occupations, can you make any definite suggestions, beyond those you have made in your memorandum, as to small agricultural industries? I am not talking of rope-making or basket-making, but of somewhat larger industries. Could the zamindars take up such industries in this Province?—I have not thought out any particular ones that could be taken up.

34,918. Perhaps I might suggest one by way of illustration. In this Report on Agriculture in the United Provinces we are told that pressing oilseeds is a feasible proposition if done on the proper scale?—Yes.

34,919. I daresay there are zamindars in the United Provinces who might start an oil-pressing industry if they had the expert knowledge, had better helpers and provided they had the will?—Yes.

34,920. Have the bigger zamindars got the will?—I have no information that they have thought about it. Some of them may have.

34,921. Have they never thought of it so far?—Some have, but generally speaking I have not much information as to whether the bigger zamindars have thought about these questions.

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34,922. I am just indicating one more line in which the technical knowledge which the department is prepared to place before the public may be utilised by the zamindars. Yesterday we were told by the Director of Agriculture that a small plant for sugar manufacture might be a paying proposition. Have the zamindars, for instance, ever thought about this problem, and approached the department for something to be done in that direction?—I do not know what the particular suggestion of the Director was, but I think that attempts at manufacturing sugarcane have not yet been very successful in these Provinces.

34,923. Are you speaking after full inquiries from the department or are you simply giving expression to your general impressions?—I have made no inquiries from the department. It is only my general impression.

34,924. Do you think it would be worth while for the bigger zamindars to make definite inquiries and find out whether in these Provinces sugar manufacture would be a feasible proposition?—Yes.

34,925. It has not been done by the zamindars?—No. No particular method has been inquired into, but the factories which have been working here have not been a great success.

34,926. There again you say you are speaking from general impressions. Have you studied the question and found by inquiry that sugar manufacture is out of the question in the United Provinces?—No, I have not studied that.

34,927. What I am suggesting is this. Is it possible for the zamindars to utilise the services of agricultural graduates, for instance, to start some industries like oil-pressing or sugar manufacture? Perhaps sufficient inquiries are not being made by the zamindars, and sufficient advantage is not being taken of the knowledge of the department. There are possibilities and prospects along these lines if the zamindars care to avail themselves of them. Do you agree?—Yes, I do agree. I have already placed before the Commission my statement that interest in agriculture should be created by Government. I do admit that there is a lack of interest in agriculture at the present time.

34,928. On the part of zamindars?—Yes, and also on the part of tenants.

34,929. *Mr. Pim*: What is the size of your farm?—It is 300 *pucca bighas*, under plough.

34,930. Have you considered using the section of the new Act for increasing its size, or are you satisfied?—I have not had to use the sections of the new Act because the farm existed before the Act was amended.

34,931. Are you satisfied with the size of your farm or are you trying to expand it?—I may have to expand it.

34,932. Is it compact?—It is in two blocks. One is situated to the north of my house about two miles away, and the other to the south, about the same distance. Only one of these blocks has a tank, and the other is irrigated by a well.

34,933. Are they both fairly well irrigated?—Yes.

34,934. How much of the area is *do fasli*?—What do you mean by *do fasli*?

34,935. I mean two crops, two crops in the same year; for instance, rice and gram?—That would be about 50 *bighas*.

34,936. Nothing very much?—No, very little. The wheat block is rotation; only the rice crop is *do fasli*.

34,937. You are anxious to extend intensive cultivation, but you said you do not grow cane?—That is so.

34,938. In certain parts of your district a good deal of cane is grown?—Yes, I know it is grown in some of my villages.

34,939. Are there defects in the soil of the villages in which your farms are?—Yes, I think the soil is not very suitable. In the block in which I tried the soil was not very suitable. I did not like to try the chief wheat block after one failure. There was another difficulty, that of *gur* making.

34,940. Was that the chief difficulty?—Yes.

34,941. In the Partabgarh and Sultanpur districts there is a strong prejudice among some of the *Thakurs* against growing cane at all. Is that felt at all in Rae Bareilly?—No.

34,942. You have never heard of it?—I do not know of it.

34,943. The last two settlement reports of these districts laid stress on the point?—I do not think there is any prejudice against it in Rae Bareilly.

34,944. You have not found it paying?—No.

34,945. Is the Agricultural Department represented in your district?—It has a small farm.

34,946. Have they a local representative?—Yes, one Babu Hari Har Singh.

34,947. Did you get their advice when you were trying to grow your cane?—I said I gave it up some years ago.

34,948. You did not do it with the help of the department at all?—Yes, I did take their advice, and I took seed from them of different varieties.

34,949. Did you try several varieties and were they always failures?—They were not very successful economically. They did not compete with wheat.

34,950. Who manages the farms?—I have a Superintendent.

34,951. Is he an old family servant?—Yes.

34,952. Did you ask the department whether they could give an explanation of the comparative failure?—No.

34,953. I mean as regards the actual out-turn of cane?—I did not ask them.

34,954. As regards labour you want to prevent too much competition for land, and you suggest alternative occupations. Are there many people in the villages in your neighbourhood who go and work outside the Provinces in Calcutta or in the mines?—Those who go out and work in Calcutta, Madras, or Bombay and so on are not of the labourer class. The labourer class mostly go to Cawnpore.

34,955. Many do go to Cawnpore?—Yes, and to Benares.

34,956. You mean to say that they have not gone to such an extent as to cause a real scarcity of labour?—No, there is no scarcity of labour.

34,957. As regards education, what is the position now as regards the lower castes getting into schools in your neighbourhood? Is there any difficulty?—There is no particular difficulty for the lower class boys being admitted into schools.

34,958. I do not mean in theory, but in practice?—No, not even in practice. I have seen some Pasi boys in primary schools.

34,959. So these difficulties have gone?—Yes, they have gone.

34,960. *The Chairman*: Is there a 30 years' settlement in your district?—Yes.

34,961. When is the settlement due?—Now.

34,962. *Sir Ganga Ram*: What is the rate of labour in your district?—It varies from 1½ anna to four annas. It is four annas for a good adult *Raja Jaganath Baksh Singh*.

labourer for lifting water; for weeding crops, boys and old women get $1\frac{1}{2}$ to two annas.

34,963. Do you think there is increased poverty in these Provinces as compared with other Provinces? In the Punjab the rate is 12 annas. Can you say why it is so? Are the people in these Provinces less industrious?—I think they are less industrious.

34,964. In Sind they are going to colonise a large number of people and give them lands. Do you think your people will go there? Have they got an ambition to better their condition of life?—Why not? I think they will go there.

34,965. Are you quite positive?—Yes. I see they are going to Mauritius and Java.

34,966. Is there any migration to Java from these Provinces?—I think a number of people have gone there.

34,967. Are they from the artisan class or from the coolie class?—Mostly from the coolie class. A number of people have returned.

34,968. *Sir Henry Lawrence*: Do you think that emigration is open now and people can go there?—I do not know whether it is prohibited at the present time or not, but I know people who have returned from there and people who are still there in different places.

34,969. How many years ago did they go there?—I have no statistics.

34,970. *Sir Ganga Ram*: What assistance or advice do you get from the Agricultural Department?—The assistance I get is in the shape of purchase of my produce, which I would not get in any other way.

34,971. Do you mean in the purchase of seed?—No, in the purchase of wheat.

34,972. You sell all your wheat to the department?—Yes, I sell it to them. If the department did not purchase my wheat, I would have to sell it at $7\frac{1}{2}$ seers to 8 seers per rupee in the market, because there it will have no value for its purity or good quality. This is the assistance I get from the department. As to advice, I get what I ask for ordinarily.

34,973. Generally speaking, do the zamindars produce pure wheat?—Those who have got farms do.

34,974. But generally, do the people mix anything with it?—Yes.

34,975. Purposely?—Yes.

34,976. And do not the department advise them to keep their wheat pure?—They do, but the advice is not yet effective.

34,977. Do the agricultural officers often pay surprise visits to villages and give advice?—Yes, I have seen Inspectors visiting my farms.

34,978. Is that advice followed?—The advice is not very popular. The advice has not yet created any belief among the tenants, so the advice does not fall on good ears.

34,979. You said something about village industries. What village industries had you in mind which could be introduced into the villages?—I took two or three from the Questionnaire and another two were suggested to me by another Member of the Royal Commission. I did not think of any spare-time industry.

34,980. Not even the spinning wheel?—I am in favour of spinning wheels. I have mentioned that.

34,981. Has that been done anywhere in these Provinces?—It was being done, but it has died out.

34,982. Do you always grow Pusa 12?—Pusa 4, Pusa 12 and Pusa 52.

- 34,983. Have you tried the Punjab wheats?—No.
- 34,984. What oilseeds do you grow?—We grow *sonson*.
- 34,985. Anything else?—No.
- 34,986. Have you tried *toria*?—No.
- 34,987. Have you made any improvement on the white gram?—No. Gram has not been my chief crop.
- 34,988. Has gram been improved anywhere in these Provinces? Have they produced Kabul gram?—I think so; I am not quite sure.
- 34,989. As a whole, what is your experience of the boys of the rural schools? After passing two years in the primary school, do they retain their knowledge or do they immediately afterwards forget it? Those who do not take to educational work—those who go back to the land—do they keep their knowledge?—I do not think that they retain it sufficiently.
- 34,990. Are your communications in these districts satisfactory?—I do not think so.
- 34,991. What are they wanting in? In metalling or bridging or what?—Bridging; and the roads are not in good order.
- 34,992. Are you a member of the Board of Communications?—No.
- 34,993. Have you made representations about that?—No.
- 34,994. I want to ask you one other question. You are governed by the Talukdari Act?—Yes.
- 34,995. How about succession? Is that by the law of primogeniture or Hindu Law or the law of inheritance?—I think the practice is not uniform.
- 34,996. What is the practice?—The practice is different. In some cases it may be primogeniture, in others custom prevails and so on.
- 34,997. If a person wants to be governed by the law of primogeniture, can that be done? Is he not subject to the Hindu Law?—I am not an expert on law, nor do I think I am in a position to answer that question.
- 34,998. Now about wells. This particular well you say has given 14,000 gallons an hour? What lift was it?—The water surface of that well is about 20 feet from the ground level.
- 34,999. When you pumped up 14,000 gallons an hour it went to what?—It went down to 35 feet and then it stopped.
- 35,000. Did it not blow sand by taking away 15 feet out of the water?—No.
- 35,001. Was this well founded on *mota*?—Yes.
- 35,002. What wells did you say failed?—Sandy wells and not *mota* wells failed.
- 35,003. Is there no *mota* available?—In some places it is, but it is very far away.
- 35,004. Have not the Agricultural Department advised you about that?—Yes, but when the *mota* has been very far away the water supply has been small.
- 35,005. Do you get coarse sand where the water stops or is it fine sand?—I did not notice any difference between the sands.
- 35,006. Would this well stand pumping at the rate of 14,000 gallons an hour if you pumped it day and night?—I did not pump it 24 hours. It has been working only for about 8 or 10 hours a day.
- 35,007. Could you tell me the cost of pumping water per acre?—I could not tell you.

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35,008. *Sir Thomas Middleton*: What is this *mota* to which you have referred?—We call it an underground stream of water.

35,009. It must be resting on clay?—Yes. Sometimes *mota* comes in *matiar*, sometimes in *bhalu*. I am not an expert in that line, but I think that sandy wells also have got strong streams.

35,010. Your rate for labour is 4 annas. That is cash payment? Is there any payment in kind in addition?—No. When the competition is high the rate goes up to more than 4 annas, but generally I get the average rate.

35,011. Is it not your custom to pay your regular workers partly in kind and partly in cash?—The custom is to pay in kind for harvesting.

35,012. Then you give them something in kind?—Yes.

35,013. What are the additional earnings in kind of the labourers at harvest time?—I do not know of any additional earning. When they are harvesting wheat they prefer to take wheat rather than cash.

35,014. What I wanted to know was, when they were harvesting wheat, whether you paid them cash and also wheat?—No cash payment, they prefer to take wheat only. They will bring a certain amount of wheat and divide it into 17 parts, out of which they take one part.

35,015. How many maunds of seed wheat do you sell in an ordinary season to the department?—This year I produced about 1,500 maunds; I do not exactly remember the amount sold to the department.

35,016. Do you have to dress your seed wheat by a winnowing machine?—I have no winnowing machine.

35,017. You winnow it by the country method?—Yes.

35,018. Do you not separate out the light seed?—We do it by laying it out in the sun.

35,019. Supposing you get 1,400 maunds from the threshing floor and remove the dust, is there anything else that you remove before sending it to the department?—We remove the dust.

35,020. Nothing else?—I do not think we remove anything else.

35,021. *The Chairman*: The small grain? That is not done here probably?—No. The process here is to take the bundles and have them beaten with sticks. Then the grain comes out and is taken to the harvesting floor. Those bundles are thrown into the threshing floor and they are threshed by bullocks tramping over them; then the *bhusa* is separated and there is some *bhusa* and some small grain mixed. The man puts them into a *supa* against hard wind and the small grains are taken out; most of the grain is taken out by beating with sticks.

35,022. *Sir Thomas Middleton*: You point out how necessary it is to have a suitable threshing machine. How many bullocks do you employ on your farm?—I have got twenty pairs of bullocks.

35,023. Are all these animals likely to be employed in the work of threshing?—Yes, for months.

35,024. Have you yourself not purchased a threshing machine?—No, because I am told that it does not make good *bhusa*, good chaff.

35,025. You do not like the chaff that is cut by the machine?—No, the bullocks do not eat it readily.

35,026. After getting the straw from the threshing machine, you can then pass the straw through a chaff-cutting machine which cuts it into short pieces. Have you not seen that implement?—No, but I have seen *bhusa* from chaff cutters; it has very sharp edges, and so it is not liked by the cattle.

35,027. I have been told by others in India that they do find this difficulty, in Britain we have no difficulty with these sharp edges?—That may be so, but here the cattle do not like it.

35,028. The only reason why you do not buy a threshing machine is that you cannot get your *bhusa* properly prepared?—Yes. And there is another reason also. It will only remain in work for one month during the twelve months of the year; it lies idle for eleven months.

35,029. But if it saves your bullock so much, as you point out, it would pay you to get one?—Economically, it will not be a great success.

35,030. That is a matter of opinion. It is worth trying, anyhow. You suffer chiefly from fodder shortage in January and February?—Those are the months in which fodder is very scarce in this country.

35,031. Do you have any of your land set aside for grass growing?—Yes.

35,032. And the supply you have available is not enough to carry you over these two months, January and February?—We do not give hay to bullocks. I have some land for growing grass which I give to horses.

35,033. Not for cattle?—Cattle do not eat it, I think. They are not accustomed to it.

35,034. But they could very easily learn to eat it?—Yes, they might, but I have not tried it.

35,035. Then you suggest that the young cattle should be castrated. Do you think that cultivators generally would agree to that in your district?—They all do castrate them and have no prejudice against doing this.

35,036. So that, if under some order unsuitable bulls were castrated, there would be no objection?—No, there would not, provided good bulls were supplied in that locality.

35,037. *Raja Sir Rampal Singh*: You are a member of the Legislative Council?—I am.

35,038. Which constituency do you represent?—I represent the Talukdars of Oudh.

35,039. Do you think that there is a general tendency in the Legislative Council for allotting money for agricultural development?—Certainly.

35,040. If the finances are satisfactory, you expect large allotments will be made for agriculture?—They have been made.

35,041. Will they be made in the future too?—In the future they will be made, provided they are to be used on useful purposes.

35,042. Do you think that at present the money that is allotted is not used for useful purposes?—It is; it is not my view that the money is being wasted; I do not say that. I even say that enough is not spent; there is more room for expansion in the department.

35,043. Is the Agricultural Department in touch with the cultivators and zamindars?—I think it is a matter of opinion. In my opinion, it is not in touch as it should be.

35,044. Is it due to its being understaffed, or is it due to any apathy on the part of the department?—I think it is very much understaffed.

35,045. You sell your seed to the department?—Yes.

35,046. And you also advance seed to your cultivators?—I do.

35,047. Do you find any apathy amongst the cultivators as regards taking up improved seed?—No, there is no apathy amongst them. The demand is growing.

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35,048. But you said that nearly the whole of your produce is sold to the Agricultural Department, without anything being kept in reserve for distribution amongst the cultivators?—That is the improved wheat which I grow; other kinds I do give to my tenants.

35,049. Why do you not give this improved seed to the cultivators, if there is a demand as you say?—Those who particularly want it, come to me and take it. I do not say that I do not give it to them at all; in certain cases I do give it to them.

35,050. Do you think that the demand is great, or is it here and there only that there is a demand?—I think the demand is increasing, although it is not very great at the present time.

35,051. Is it due to the fact that the cultivators have no faith in this improved seed, or is it due to any other cause?—In places where there are no successful demonstration farms they have no faith in the improved methods, but where there are successful demonstration farms of zamindars or of Government, they have taken to going in for improved methods.

35,052. They have taken to them?—Yes, and this convinces me of the utility of successful demonstration farms.

35,053. You say in your statement that it is not necessary that the teachers in rural areas should be drawn from agricultural classes. Do you not think that those belonging to urban areas are quite unacquainted and out of touch with agricultural life, and therefore if teachers from the agricultural classes are employed they will be more beneficial?—When I said agriculturists, I had in my view other classes living in the rural areas; I did not make any difference between rural and urban population.

35,054. Do you mean that people who belong to the rural areas should be employed?—Yes; even those who do not belong to the agricultural classes.

35,055. Have you any knowledge of those who have come out of the Agricultural College?—Yes.

35,056. If they do not get Government employment, do they adopt agriculture as a profession, or do they seek for other jobs?—I do not know of any one of them that has taken to agriculture as a profession.

35,057. What is your general experience about these men who come out of the Agricultural College? Have they sufficient knowledge of agriculture to give proper advice and to stimulate agriculture in the country?—I have not studied the question from that point of view, but I say that when they have no particular interest in agriculture, I believe they have no particular knowledge of agriculture.

35,058. Do you mean that they are deficient in that knowledge?—Otherwise, they should go in for agriculture as a profession rather than for service.

35,059. You say in your note that these agricultural institutions in rural areas should be administered and financed by District Boards and the Government?—Yes.

35,060. Do you not know that the District Boards suffer from financial stringency?—That is why I have added Government.

35,061. You know that the Government is in the same position, as they have to pay contributions to the Imperial Government?—Yes. We have been repeatedly requesting the Government of India through this Government for a reconsideration of the question of our contribution to the Government of India.

35,062. This year you have had a profit of about 75 per cent.?—Yes, I think it is more.

35,063. Was this the case in previous years also, or is it a special case this year?—The profit has been quite good in the previous years, but it has been on the increase, and the figures which I gave are for the last year.

35,064. I believe there are many other farms in your district?—There are.

35,065. What is your knowledge about them? Do they also have the same profits every year?—I cannot say anything with authority, but my information is that they are not doing well, excluding one more which is doing very well, and that belongs to you.

35,066. The others are not doing well?—The others, I am afraid, are not doing very well.

35,067. May I ask you what other difficulties the cultivators have in getting *taccavi* from the Government? Do they have to pay more in the shape of tips?—Yes, illegal payments. I mean illegal payments when I use the word harassment.

35,068. They have to pay tips to several persons at the time of taking *taccavi*?—My object in using the word harassment was to convey the idea that they have to make illegal payments.

35,069. You think that, at the time of taking *taccavi* and at the time of repaying it, the cultivators have to undergo great hardship on account of other payments they have to make?—Yes; and in spite of the concession which the Government makes in interest, the cultivator has to pay more than what the moneylender gets from the tenant.

35,070. It is swallowed by others?—Yes; that is what I think.

35,071. Do you think that the indebtedness of the agriculturists is to some extent due to very small incomes from agriculture?—It is; that is one of the chief reasons.

35,072. You say that the consolidation of holdings is very difficult in these Provinces. What are the difficulties?—The chief difficulty is that the cultivator requires several sorts of land which cannot be found at one place. For instance, rice land, *dumat* and *bhul* land cannot be consolidated in one.

35,073. Do you mean to say that economically it suits the cultivator to have land in different zones, so that when there is heavy rainfall he can get some produce from lands which require that rainfall?—I follow you; that is right.

35,074. Do you think that subdivision can be stopped by making an amendment in the law of inheritance?—That will be one way of preventing fragmentation and subdivision.

35,075. Is the present rent law encouraging subdivision? Some heirs have been fixed by the law, and all of them are sharers of that holding whenever the tenant dies?—Yes. In this way it leads to subdivision.

35,076. Has any power been given to the landlords to keep the holding intact if they wish to do so?—No.

35,077. You perhaps know that in the preparation of *ghi*, a large quantity of cow-dung is consumed?—Yes, in the shape of *kanda*.

35,078. It is not only for cooking purposes that cow-dung is used, but even for *ghi*-making purposes?—Chiefly for *ghi*-making purposes. For cooking, fuel may be substituted, but for *ghi*-making and boiling milk *kanda* is the chief thing.

35,079. *The Chairman*: Will you please explain that?—If fuel is used for preparing *ghi*, it does not produce as good *ghi* as when *kanda* or dried cow-dung is used.

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- 35,080. How is that?—That is the practice.
- 35,081. Can you explain it at all? What is the particular virtue of cowdung in the preparation of *ghi*?—It does not give so much smoke and such strong heat as fuel.
- 35,082. It gives slow fire without smoke?—Yes.
- 35,083. *Raja Sir Rampal Singh*: You may have heard that in some districts such as Gorakhpur, the zamindars have come forward in large numbers to have machinery for sugar-making and other things?—Yes.
- 35,084. You think that if it be proved that the use of machinery is profitable, the talukdars and zamindars will not hesitate to go in for it?—That I have maintained all through in my statement.
- 35,085. Have you found any difficulty in getting advice from headquarters, especially from the Engineering Department, about the sinking of wells, the setting up of machinery, or anything like that?—We do get advice. I think there is a great lack of engine drivers. I know of a case where a well has lately failed. The man applied for an engine for a short time, because there was no other way, and the engine was supplied, but the driver was not available; he had to find his own driver for a very short period.
- 35,086. *Sir Ganga Ram*: What amount of pay would you be prepared to pay to the engine driver?—A reasonable amount.
- 35,087. What do you consider a reasonable amount?—I think drivers are paid from Rs.20 to Rs.30; that is the *mamul*.
- 35,088. Is the system of letting loose Brahmani or religious bulls still in vogue in this Province?—Yes, it is.
- 35,089. Is it not stopped by law?—No.
- 35,090. You would not advise stopping the practice by law, because they spoil the breed?—Something is better than nothing; where there are no bulls, these bulls will do some good. Why should you stop the practice by law?
- 35,091. When you say that boys from the Agricultural College do not take to agriculture as a profession, naturally they will say that they have no land to go to. What remedy do you propose for it?—What about those who are agriculturists?
- 35,092. Every one is not an agriculturist. (What method would you propose for those who are not agriculturists?—When I said that, I had some of agriculturists in mind.
- 35,093. Those who had land?—Yes. I do not know any of them that has taken to agriculture as a profession.
- 35,094. You grow *juar*?—Yes.
- 35,095. As a fodder or as a cereal?—As a rotation crop.
- 35,096. You take the grain?—Yes.
- 35,097. You do not grow it only for fodder?—In some cases it is grown for fodder, but then it is grown early in the month of May and cut down by August.
- 35,098. You said that you had great difficulty in finding suitable fodder in the months of January and February. Why do you not grow *sagis*?—I do not know what it is.
- 35,099. It is a kind of clover. It feeds cattle in January and February, and it is a good leguminous crop?—I have raised this question so many times in the Legislative Council, but nothing has yet been done in that connection as far as I know.

35,100. *Raja Sir Rampal Singh*: Is there general scarcity of fodder in your district?—You mean grazing grounds? Fodder in what shape?

35,101. Is there general scarcity of fodder in any shape?—Sometimes there is and sometimes there is not. Fodder in the shape of *bhusa* this year is not scarce.

35,102. *Professor Gangulee*: You say you sell your seed to the Agricultural Department. Are your seed farms inspected by that department?—Yes. It is not a seed farm, it is a demonstration farm, and I sell the produce.

35,103. I understand you grow one variety of Pusa wheat?—I have been growing two varieties for some time, and last year I tried a third.

35,104. Your farm is inspected by the Agricultural Department and you sell the whole of your produce to them?—I do.

35,105. What price do they pay for wheat?—They paid me 6½ seers per rupee this year.

(The witness withdrew.)

The Commission then adjourned till 10 a.m. on Wednesday, the 2nd February, 1927.

Raja Jagannath Baksh Singh.

Wednesday, February 2nd, 1927.

LUCKNOW.

PRESENT :

The MARQUESS OF LINLITHGOW, D.L. (*Chairman*).

Sir HENRY STAVELBY LAWRENCE,
K.C.S.I., I.C.S.

Sir THOMAS MIDDLETON, K.B.E.,
C.B.

Rai Bahadur Sir GANGA RAM, Kt.,
C.I.E., M.V.O.

Sir JAMES MACKENNA, Kt., C.I.E.,
I.C.S.

Mr. H. CALVERT, C.I.E., I.C.S.

Raja SRI KRISHNA CHANDRA
GAJAPATI NARAYANA DEO OF
PARLAKIMEDI.

Professor N. GANGULEE.

Mr. B. S. KAMAT.

Mr. A. W. PIM, C.S.I., C.I.E., I.C.S. } (*Co-opted Members*.)
Raja Sir RAMPAL SINGH

Mr. J. A. MADAN, I.C.S. } (*Joint Secretaries*.)
Mr. F. W. H. SMITH

Mr. B. D'O. DARLEY, C.I.E., I.S.E., Secretary to the
Government of the United Provinces, Public Works
Department, Irrigation Branch.

Replies to the Questionnaire.

QUESTION 1.—RESEARCH.—(a) (i) The necessity for a special irrigation research division has been recognised for many years. Unfortunately, the Irrigation Department of these Provinces has been so short-handed that no suitable officer could be spared. The question of opening an experimental division with an agricultural sub-division was raised in 1917, but reluctantly dropped because so many officers were on military duty connected with the War. Before many of these officers had returned, the Sarda canal construction had been commenced, and it is with the greatest difficulty that the thirteen new divisions on the construction of that canal are being manned at present. Now that work is nearing completion the question of forming a research division will be taken up in the immediate future.

(c) There is a vast field open for inquiry apart from the design of canal works. The most important of these is undoubtedly a study of the means by which water can be economised and irrigation extended with the supplies at our disposal for existing canals. Almost all sources of supply have been tapped wherever irrigation is needed in these Provinces. Only by economising water in these areas will it be possible to extend irrigation facilities for further cultivation.

It is estimated that only about 50 per cent. of the water entering a large canal system reaches the cultivators' fields, and then more than is

necessary to mature the crops is invariably given. It is estimated that 1,500 c. ft. per second will be lost by evaporation and absorption from the main lines of the Sarada canal, enough to maintain 300,000 acres during the *rabi* season. There will be further losses in the distributaries, and last, but by no means least, losses in the cultivators' watercourses. The question of minimising the losses from an irrigation channel has been engaging the attention of canal officers not only in these Provinces, but all over India for years. Something has been done by designing canals with flat bed slopes where the soil is very porous; this causes silt to settle into the pores and check the seepage losses. Apart from this, no means have so far been found which are efficient, durable and at the same time sufficiently inexpensive to be an economic proposition. Until this problem can be solved, it will be necessary to obtain water by economy from the three following sources:—(1) cultivators' watercourses, (2) more efficient distribution, (3) amount of water given by the cultivators to their fields.

To take these in turn:—

(1) *Cultivators' watercourses.*—On all new canal systems the main watercourses are being constructed by Government at the same time as the canal; they are therefore the minimum length required and laid out to the best advantage. On all the older canals the cultivators dug their own watercourses, and many of these twist and turn unnecessarily and are not on the best alignment. Much could be done by straightening these, and by reducing the length at the same time to reduce the absorption losses.

(2) *More efficient distribution.*—In the old days when there was a demand for water, all distributaries were run continuously and, when the supply of water was short, reduced supplies were given to all channels equally. Much has been done to minimise losses by opening distributaries alternately and running them with full supplies for shorter periods, generally one week at a time. The week has long been the accepted unit and the size of outlets has been fixed accordingly. Cultivators understand this unit, and it would be difficult to alter matters now; at the same time it is a known fact that an outlet of a certain size running for any fixed period will irrigate a larger area than an outlet of half the size running for double this period. For this reason, some officers consider that it would be advantageous to have a five-day running unit, longer closures and larger outlets. Most careful measurements would have to be made by a research officer before such a drastic step could be taken.

Considerable economy has been effected during the past thirty years by turning large cultivators' watercourses into Government minors, and now cultivators seldom have control of a watercourse drawing more than one cusec. For this reason most officers consider modules unnecessary, since the size of outlets is fixed according to the area to be irrigated and they are always set a certain depth below the full supply level in the distributing channel. Further experiments are however required to see if, even so, modules would not effect a useful economy.

(3) *Amount of water now given to crops by the cultivators.*—The cultivator undoubtedly gives far more water than is necessary when flow irrigation is available. Where he has to lift water from tanks, wells or canal watercourses, he prepares his fields most carefully, splitting them up into small compartments and watering each of these in turn with the greatest care. In such cases it is estimated that he uses only half the quantity, often with an equally good outturn of crop. For this reason many officers have advocated lowering all Government canals till the cultivators are compelled to lift water to their land.

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Efforts have been made to force the cultivators to economise water. Fines were instituted some thirty years ago when fields were not split into compartments or *kiaris*, and the same experiment was tried once more a few years ago. On each occasion most of the cultivators preferred to pay the fines and very large sums were collected. This caused considerable resentment without effecting the hoped-for economy, and the effort was therefore abandoned in each case after a trial for a few *faslis*.

Undoubtedly the best means of checking wasteful methods would be to sell water by bulk, but here the difficulties in almost every case are insurmountable. Holdings are so small that every watercourse supplies numbers of cultivators, all of whom would have to have separate meters to gauge the water used by them. There are over 50,000 watercourses taking off canals in these Provinces and the question of supplying a number of meters for each would appear impossible at present. A research officer with time and money to develop experimental ideas might eventually overcome the obvious difficulties even in this case.

One of the chief duties of a research officer would be to keep in touch with modern irrigation practice not only in other Provinces, but also in other countries. The science of irrigation is developing year by year in America, South Africa, Australia and elsewhere, and little is done at present to collect and record the experience gained in different parts of the world.

In India, irrigation is far too provincial and there is little interchange of ideas between one Province and another. The Institution of Civil Engineers (India) was supposed to remove, to a certain extent, this disability, but, for reasons it is unnecessary to mention here, this institution is not popular amongst P.W.D. officers and very few have joined. Also, embracing as it does all classes of engineering, irrigation can only find a place among many other subjects which have little or no interest for irrigation engineers.

Engineers in India have always been diffident about publishing the result of their experience, priding themselves that they do their work without advertising. Any notes that have been written have rarely gone beyond the local Secretariat, where invaluable matter is buried in such a manner that after a year or two it is often entirely forgotten. The world at large knows little of the great irrigation works of India, and officers of one Province often know nothing of what is being done in an adjoining Province. Mistakes are made and money is wasted because experience gained is unknown outside a limited circle and often forgotten altogether.

The Punjab has got a local Engineering Congress, which, by reason of the fact that the majority of the Engineers in that Province are irrigation officers, has advanced the science of irrigation engineering enormously. Bombay has also got an Engineering Congress, but the subjects dealt with are often of little interest to the irrigation engineer.

There is a crying need for an All-India Irrigation Congress with headquarters and a library at some central place like Delhi, where notes and papers already written would be collected and tabulated and members from all Provinces could meet, read papers and exchange views, and so dissipate the provincial spirit which is such a bar to progress at present.

The obvious head of such a congress would be the Consulting Engineer to the Government of India. Under him would be an assistant who should be selected most carefully from amongst the keen engineers of one of the provinces; this assistant would act as librarian and would keep in touch not only with the research officers in the various Provinces, but also with the irrigation practised in America, Australia and elsewhere.

This proposal was brought forward in 1925 and was welcomed by all Irrigation Engineers of the various Provinces consulted. It was therefore

forwarded demi-officially to the Acting Consulting Engineer to the Government of India but nothing has been done pending the decision on the question of the continuance of that post. It would be little short of a calamity if this post is abolished, and this liaison officer, in touch with every part of India, is not available to advise provincial officers and keep them in touch with improvements found possible elsewhere. Without such an officer of ripe experience to direct the librarian, organise the annual meetings and generally superintend the whole organisation, an All-India Irrigation Congress cannot progress satisfactorily. The knowledge gained by local research will not be properly discussed and disseminated, and irrigation practice will remain provincial as at present.

The above paragraph also answers the point raised in Question 4 as to the means by which the Government of India can aid and supplement the activities of the Local Governments.

QUESTION 8 IRRIGATION—(a) A map* showing the areas (painted blue) commanded by canals already constructed or under construction in these Provinces is attached. Although these canals cover a very large area, the percentage of the gross commanded area irrigated is very small. Thus on the Upper Ganges canal only some 1,100,000 acres are irrigated annually out of a gross command of 5,350,000, or 21 per cent. On the Lower Ganges canal this percentage is 14, on the Eastern Jumna canal 23, and on the Agra canal only 19 per cent. A considerable amount of this commanded area is unsuitable for irrigation, either because it lies too low or is too sandy, but undoubtedly irrigation could be usefully extended to a very large area if water were available. As already stated, the remaining large tracts are either unsuitable or do not need irrigation, or there are no supplies available.

The largest of these tracts lies north of the Sarda river and comprises the districts of Bahraich, Gonda, Basti and Gorakhpur. The rainfall of these districts is heavy and spring level is high. Crops can be grown without irrigation in most places, or where this is needed wells can be sunk at a very small expenditure. The larger perennial streams have been examined, but any canals proposed have met with determined opposition and have been shelved as not required.

A large area between the Sarda and the Ganges in the districts of Ballia; Ghazipur and Azamgarh are somewhat similar and will never require canal irrigation. The upper part of this *doab* will be irrigated by the Sarda canal now under construction. Opinions have varied regarding the necessity for this canal since first it was proposed in 1870. Spring level is usually high, but after a succession of dry years it falls rapidly and the demand for canals arises, to disappear once more after a few years of good rainfall. For this reason scheme after scheme has been prepared in the past, to be abandoned before construction was started. The present scheme is well under way, and it is anticipated that it will be open for irrigation in 1928.

The lower portion of the *doab* is less in need of irrigation; it can however be commanded by a Lower Sarda canal; the feasibility of this scheme has been established by careful investigation; it is however being held in abeyance until the upper canal has solved by actual experience the knotty question as to whether canal water is likely to be utilised sufficiently to warrant this further costly extension further east.

The only other large unirrigated tract north and east of the Ganges lies in Rohilkhand in the districts of Bijnor, Moradabad and Budaun. There was previously a proposal to build an Eastern Ganges canal for this area, but this has been abandoned since all available water in that river is more

* Not printed.

urgently required in the Ganges-Jumna *doab*. The only other large river in the tract—the Ramganga—has been investigated more than once, but any schemes prepared have always been abandoned because the supply in this river falls to an almost negligible quantity in the cold weather when water would be most needed for *rabi* and sugarcane irrigation.

All the small streams in Bijnor have been fully exploited and every drop of water is utilised at present. The possibility of constructing two small canals from the Gangan and Sot rivers in Moradabad and Budaun respectively is under investigation; apart from these no further works seem possible.

The Ganges-Jumna *doab* already discussed is fully commanded by canals, and it only remains to consider the tracts lying south of the Jumna river, viz., Bundelkhand and Mirzapur. This country is for the most part covered with wild rocky hills and the rivers run dry shortly after the rains cease. Irrigation of such land as is suitable entirely depends on tanks and storage works. Such schemes are expensive and can only be constructed where protection is urgently required as an insurance against famine. The Betwa canal was the only irrigation work south of the Jumna at the beginning of this century; since then every large river has been tapped and hundreds of small tanks constructed and some Rs. 250 lakhs all told have been spent. These works result in a net loss to Government of some Rs. 5 lakhs to Rs. 6 lakhs each year. A certain amount still remains to be done; further reservoirs have been proposed on the Betwa and Dhasan rivers to supplement those already in existence and so allow a further extension of irrigation. A few smaller storage schemes have also been proposed—the Ohen and Paisuni canals in the Banda district and the Belan canal in the Allahabad district. These schemes cannot be made paying propositions, and as they are really only required urgently in famine years, they must wait until money is available.

Apart from these works, there is endless scope for small tank schemes. In most cases these can best be taken up as famine relief works when opportunity permits.

This general survey of the irrigation possibilities and necessities of these Provinces has been given to show that no large advance of canal irrigation can be looked for after the Sarda canal has been completed. Undoubtedly the most important point to be studied at present is the extension of irrigation with the supplies available in existing canals, and this question has been fully discussed above under the heading "Research."

If existing river supplies have been all but fully utilised where irrigation is needed, there is one source which must some day be tapped if the soil is to be made to give the maximum yield possible.

Except in the rocky country south of the Jumna there is an inexhaustible reservoir in the subsoil close below the surface. The cultivators themselves have built innumerable wells in every district, but the yield from these surface wells is small and the means by which the water is lifted primitive and expensive. The Agricultural Department have sunk a large number of tube-wells of late years and their activities continue expanding. This branch has so far been left to that Department, but the time is now at hand when the canals should be called upon to supply hydro-electric power for lifting water on to land which cannot receive canal supplies, or, where conditions are favourable, substituting pump supplies from tube-wells for existing canal supplies, which could then be freed for land elsewhere. The great obstacle in the past has always been the fact that canal irrigation rates are so low that if applied to pumped supplies the pumping scheme became unremunerative. It is difficult also to have two sets of irrigation rates in adjoining land, one for canal irrigation and one for irrigation from pumped

supply. The State also cannot undertake unremunerative works except as a famine protective measure. Until therefore the cultivator is willing to pay a much higher rate for a pumped supply, it will be difficult to advance far in this direction. When he realises the advantage of such irrigation and is willing to pay a fair percentage on the capital outlay on such schemes, then there is an unlimited field for expansion and all manner of pumping schemes from tube wells and from low-lying rivers can be taken in hand as capital can be made available.

(b) The points raised in this question have been fully dealt with under the heading "Research."

Oral Evidence.

35,106. *The Chairman.* Mr. Darley, you are Secretary to the United Provinces Government in the Irrigation Department?—Yes.

35,107. Would you tell the Commission whether you think the touch between your own department and the Agricultural Department is as close both at headquarters and in the districts as you could wish?—I have never had any reason to suppose that it was not. When one comes to think of it now that the point has been brought forward by the Commission, I should say that something more perhaps might be done than has been done in the past, especially in the matter of well irrigation; we have left that entirely to the Agricultural Department.

35,108. You deal with that in your note. I suppose it is, broadly speaking, true to say that every irrigation problem has its agricultural side?—Yes. One thing that I have brought forward in my note is that we want a research division. In 1917 we brought up that question. At that time it was proposed to have an agricultural subdivision of that division. That, I think, would be a very good thing.

35,109. Do you divide your existing schemes of irrigation under the two heads of "productive" and "protective" in these Provinces?—Yes.

35,110. I think we have complete information in the various papers that have been provided?—Yes. Roughly, we may say that all schemes north of the Jumna river come under the head of "productive," and all schemes south of the Jumna river in Bundelkhand would come under the head of "protective." If the schemes north of the Jumna river are not productive, they were built with the hope that they would turn out to be productive. A few have not turned out to be productive.

35,111. Have they been definitely changed over to the protective list?—Some are about to be changed over. For instance, in Rohilkhand they are about to change over some schemes to the non-productive list.

35,112. They having failed to produce the necessary returns?—Yes.

35,113. Before I turn to your note of evidence, I do not know whether there is any other matter that you would like to place before us in amplification of what you say there?—I do not think there is anything else.

35,114. Do you think a central research station dealing with the fundamental problems of irrigation under the Government of India would be helpful?—I have dealt with that I think fairly fully in my note, under Research. I think it is not only helpful but absolutely essential that we should have a central organisation which would bring together the experience gained in other Provinces so that it could be utilised all over India.

35,115. Yes, I have read your note with care. I was not quite sure whether you wanted a central body actually to carry on research?—No,

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I think we must have provincial research and that information collected together at a central point.

35,116. You do not think these basic problems are of general application throughout the irrigation schemes?—The conditions of irrigation in every Province are so very different. In the Punjab you have got 10 to 12 inches of rainfall a year and they think almost entirely in wheat. In the Central Provinces and Bengal they think altogether in rice. Here we consider that sugarcane and wheat are the most important crops, whereas in the Punjab I think I am right in saying there is comparatively little sugarcane.

35,117. Take the problems of salinity, of water-logging, or seepage and the problem, which you refer to in your note as requiring further research, as to whether it would not be better to irrigate through larger outlets for a shorter time; are not those fundamental problems which might be dealt with by a central research station?—Yes, but I think it would be better to deal with them in different Provinces and then see if our results agree.

35,118. You do not think a central research station, if it could be devoted to useful service, might give life to the central organisation which you yourself are eager to create?—Certainly it would be a help, but it is not so essential as having these provincial research stations which would deal with local problems.

35,119. Is there not a little danger that when one is discussing these matters in theory the diagrammatic idea rather supervenes and one perhaps forms the notion that material for research is like a cake and there is not enough to go round? Is not the position really that there is so much to investigate in the future that, provided there are reasonable arrangements between the various bodies, whether central or provincial, there is no reason to fear overlapping at all; is not that rather the position?—I do not think overlapping in this case would do much harm, because any overlapping would tend to corroborating results obtained in other Provinces. A central research station would certainly be of enormous advantage.

35,120. I rather judge from your note that you are of opinion that your own department should take over the responsibility for well irrigation?—I am sorry if that impression has been given. I do think, however, that we might take over from the Agricultural Department the matter of canal hydro-electric well pumping schemes, but that is a big problem.

35,121. Could you work a joint scheme with the Agricultural Department if you were engaged in popularising the use of mechanical lift irrigation and also attempting to develop wells in areas now served by canal water, in order to conserve the canal water for areas lower down the system? Do you think it would be feasible to devise a scheme of development of that sort between your own department and the Agricultural Department?—It would be rather difficult to combine; we would do all we could to help the Agricultural Department, but if they came in, the scheme must be under their direction.

35,122. Then are you definitely of opinion that the well irrigation side should remain with the Agricultural Department?—Yes, I think so at present; we have not got the staff to take up any further work and it also goes outside the canal area; well irrigation extends over the whole Province.

35,123. Do you see any prospect of the volumetric basis of charge being adopted in this country?—I am afraid not. In this Province the holdings are so very small that the difficulties of volumetric measurement for each

holding make it impossible. If we ask the larger landholders to take water by volume and distribute it, the distribution will cause many complaints from the cultivators who will not get their fair share of water.

35,124. On page 159, in answer to Question 8 (a), you say: "The Agricultural Department have sunk a large number of tube wells of late years and their activities continue expanding. This branch has so far been left to that department, but the time is now at hand when the canals should be called upon to supply hydro-electric power for lifting water on to land which cannot receive canal supplies, or, where conditions are favourable, substituting pump supplies from tube wells for existing canal supplies, which could then be freed for land elsewhere." I rather gathered from that sentence that you thought there ought to be a transfer of certain responsibilities from the Agricultural Department to your own?—No, I think it is more a question of the Canal Department taking on new schemes for well irrigation in conjunction with hydro-electric installations worked from canal falls; there we could take over the well irrigation. That, of course, is very nice in theory, but in practice there are insuperable difficulties, because you cannot make this pay at the present irrigation rates. If Government take it up, it would have to be as a non-paying proposition.

35,125. It is difficult to conceive one set of cultivators paying a low rate for canal-carried water, while their neighbours are paying a higher rate for lifted water?—That is the whole problem; we are faced with that difficulty.

35,126. Is there any hope of any extension on these lines unless you level the charges down, raising the canal rate and keeping the lift rate where it is?—Any raising of canal rates has always been opposed very strongly in the local Council. We hold that our irrigation rates are low; they are slightly lower than in the Punjab. If our rates could be raised slightly, one might take the rough with the smooth, and lose a little on the well irrigation.

35,127. This Commission is debarred by its terms of reference from considering the charge made?—But the two questions are bound together.

35,128. To what extent does the Council control the irrigation water rates?—They have no control whatsoever over the water rates, irrigation being a reserved subject, but still the Government do not charge more than they have to, and they like as far as possible not to go against the will of the people in this matter if they can afford not to.

35,129. Do you find that the Council takes an active interest in the matter?—It takes a very active interest in the matter of irrigation rates.

35,130. Have there been debates on the question?—There have been several questions and debates with regard to irrigation rates. The rate for sugar cane, for instance, has been twice raised and twice lowered owing to questions being raised in the Council.

35,131. *Sir Henry Lawrence*: Was a resolution passed in the Council?—I think I am right in saying there have been resolutions passed in the Council with regard to it, but I should like to look that up to make absolutely certain. There have been questions raised.

35,132. *The Chairman*: Are you at one with the Agricultural Department as to the amount of water required for each crop?—Yes, I think so; but I do not think either of us know definitely what is the exact amount of water which should be given.

35,133. Would that be a useful line of research?—That is one of the first lines of research which is absolutely necessary; I think Mr. Clarke is just about to make some experiments on that very point.

35,134. In the meantime, speaking generally, and setting aside the Sarda scheme, I gather from your note that you think it is in well irrigation

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that development must in the main to take place?—Well irrigation and economy of water on existing canal schemes; that is where research is necessary, to see how we can economise.

35,135. Have you worked out for any particular area what would be possible in the way of extended irrigation if you could persuade cultivators in the higher reaches of the system to exploit the subsoil water rather than to take their full share of the canal-carried water?—No, I do not think anything of that description has been done; I do not think they would forego their rights.

35,136. There, again, you are up against the difficulty of expense?—Expense is one thing, but the cultivator will never exchange the canal water for well irrigation, and we would be faced with the difficulty of altered values of land.

35,137. That suggestion has been made to the Commission from various sources, but you yourself do not think it is feasible?—I do not think it is feasible, because the mortgage rates have changed with the introduction of irrigation; if you say they have got to take their water from wells, all the mortgage values will depreciate.

35,138. Have you anything to say as to the practice of the average cultivator in relation to irrigation in this Province? Are the cultivators reasonably careful of the water?—We tried to force them to economise the water by imposing fines if they waste it, but where they have got flow irrigation they take as much water as they possibly can, irrespective of whether it is absolutely necessary for the crop.

35,139. Is the practice of making *kiafis* general?—We have tried that twice; about twenty years ago an effort was made to force the people to make *kiafis* so as not to waste so much water. Those attempts failed; the people preferred to pay the fines and not make the *kiafis*, on each occasion. Then we found it was possible for the petty canal officials to use this as a means of getting at the unfortunate cultivator, the *kiafis* were not made, the water was wasted as before, and it was only a case of Government getting a little extra revenue, while Government desired to spread the water to cultivators who had not got it; the water did not go to the cultivators who had not got it; it was wasted as before. It was tried again five years ago with the same results and so fines were abolished.

35,140. Do you have many complaints from cultivators as to the action of subordinate members of your service in relation to petty exactions and matters of that sort?—No, very few indeed. There is always a certain amount of underhand work, but there are few complaints, and the subordinates know very well that they will be turned out at once if they are caught.

35,141. *Sir Ganga Ram*: You will admit that you have got sufficient rainfall in this Province to make it possible for every inch of the ground to grow crops?—Practically everywhere.

35,142. The difficulty arises in regard to the unequal distribution of rainfall?—Yes, for certain classes of crops.

35,143. You are aware of the fact that there are 10,000,000 acres of cultivable waste land in this Province?—It depends on what you class as cultivable.

35,144. I am quoting figures of the Government of India?—I know certain districts where the Settlement Officers are unable to say whether land is cultivable or not. For instance, in the districts of Lucknow and Unao there are vast areas of *reh* and *usar* soil, which the people in some years are able to cultivate but in other years are not able to cultivate. I know one settlement officer classed such land as half cultivable and half uncultivable.

35,145. Could you give us any idea as to how much of that 10,000,000 acres is Crown land and how much belongs to the people?—Government has very little land of its own.

35,146. Does all that 10,000,000 acres that is put down as cultivable waste belong to the people?—Yes. Also, I do not know exactly what is classed as cultivable waste. Perhaps Mr. Pim could tell us whether, for instance, land under water is so classed.

35,147. *Mr. Pim*: No, it would not include land under water; land which it is impossible to cultivate would not be included. The bulk of the waste is cultivable waste; it is only limited areas which are really uncultivable?—There are very limited areas which are cultivable which are not taken up in this Province.

35,148. *Sir Ganga Ram*: I will ask the Revenue Secretary?—Yes, he might be asked about that.

35,149. Do you also know that at present there is only .20 irrigated protected area per head in this Province, whereas it ought to be 0.4 according to the Famine Commission's Report?—Do you include well irrigation?

35,150. Yes, including well irrigation?—No, I do not know that figure definitely.

35,151. That shows what scope there is for extension of both well and canal irrigation?—Yes.

~~35,152.~~ Have you considered the question as to whether, if all your rainfall is equally and evenly distributed and according to seasons, every inch of ground could not raise some crop or other?—Yes, it could.

35,153. Can you make a calculation as to how far you allow your rivers to run to waste?—One could make a calculation of that description. For instance, the Gogra river, the biggest river perhaps in Northern India, carries from 10,000 to 12,000 cusecs in the cold weather; but we do not tap it at all because it lies too low. Do you call that running to waste?

35,154. It may be a waste to your Province though of course it might be used elsewhere. Tell us how much water you allow to be wasted from your Province; will you give us the calculation river by river?—Yes.

35,155. *The Chairman*: I suppose that is quite apart from the question whether it would pay to use that water?

35,156. *Sir Ganga Ram*: Yes. At present your productive schemes pay 6 per cent.?—Yes.

35,157. Does this 6 per cent. include the enhancement of revenue?—Yes.

35,158. In sending up a protective scheme do you observe all the conditions mentioned on page 32 of the first part of the Irrigation Report?—

35,159. Five factors are given there:—

“The direct protective value of an irrigated area, or the capitalised value, at 25 years' purchase, of the saving in average annual cost of famine which will be effected by every acre brought under irrigation.

“Estimated total cost of famine in the given tract for a period of 25 years, or quarter of a century.

“Population of the tract, with necessary addition for prospective increase.

“Area in acres which should be protected by irrigation for each head of the population.

“Area in acres already protected.”

They have given there a very good formula; 6 per cent. is not after all the only criterion?—When you send up protective schemes the 6 per cent. criterion is not considered at all.*

* See also Appendix on page 745.

35,160. My object in drawing your attention to this fact is that, if you calculate your works under this formula, many of your protective works will become productive. Has the attention of Government been drawn to that fact?—If it is necessary; even in the Sarda Canal Report that point was taken into consideration, and the famine expenditure for the area was given in detail in the Report.

35,161. It has been represented to me that some very important schemes are often thrown out simply because only the direct return and the indirect charges are taken into account and they do not take into account the other items which I have mentioned above?—I do not know of any scheme that has been thrown out for that reason.

35,162. Many of the Provinces have been obliged to throw out their schemes for the reason I have mentioned. If that is so, would you recommend that that question may be considered by the Government in that light?—I certainly think that we should take credit for some famine expenditure, but Government does take all that into account.

35,163. It has been represented to us that several important schemes which may protect large areas are thrown out simply because these are the only two factors which are taken into account?—I do not think that has happened in this Province. The Province has gone ahead with irrigation in the last twenty years as far as financial conditions permit.

35,164. What are the months in which you consider there is dearth of water?—If you are taking the perennial canals, the dearth of water begins from January and lasts through February and March; the snow water begins to come down towards the end of April and then there is sufficient supply.

35,165. So there are four months, January, February, March and part of April in which there is dearth of water?—Yes.

35,166. And in these four months, do you put in sugarcane which is the main crop of this Province?—Yes, but I would not call it the main crop; it is an important crop.

35,167. Have you thought of supplementing the supply by wells and subsoil water?—Yes.

35,168. Have you considered the hydro-electric aspect of the question? How you could raise the water and so on?—We have considered that so far as to satisfy ourselves that it would not be a paying proposition from the Government point of view; if the people are willing to pay higher rates, then it might be done.

35,169. Are your rates higher than those in the Punjab or lower?—Lower; let us take Western Jumna canal and compare it with our Eastern Jumna canal. The rate for the Punjab sugarcane is Rs.12 and ours is Rs.10; for wheat their rate is Rs.5-4-0 and ours is Rs.5; for cotton their rate is Rs.3-8-0 and ours Rs.3.

35,170. Do you think there will be opposition in the Council if you attempt to bring up the rate to the level in the Punjab?—They were raised to the same level in some cases. The rate for sugarcane was raised to Rs.12 but owing to the opposition in the Council it was again reduced to Rs.10.

35,171. Do you allow water for green manure crops free or do you charge for that also?—We charge for water on all occasions, excepting for filling tanks for watering cattle.

35,172. For green manure?—I do not know if any quantity of green manure crops are grown in this Province; the question of a reduced rate has not arisen at any rate.

35,173. You have no favourable rates for the growing of fodder? Recently in the Punjab we have reduced the rates for water required for the growing of fodder, up to a certain limit?—The question has never arisen in this Province nor is it such a vital one here as in the Punjab, seeing that the rainfall is much higher here.

35,174. So people do not suffer very much from want of fodder?—Not so much except in exceptional areas.

35,175. In the winter season they must suffer from want of fodder?—At the present time they are feeding the cattle on the *juar* stalks and such things.

35,176. But you must mix it up with some green stuff?—This is not done in many parts of this Province; at any rate the question of a preferential rate has never come before the Canal Department.

35,177. Suppose there are two crops grown at the same time, for instance, gram and oil seed, do you charge for the two crops or only one?—We charge for only one crop.

35,178. You do not charge for two?—No, only for one crop, whichever is of the higher grade.

35,179. This question arose in the Punjab in this way: we generally sow there gram and oil seed together; we cut the oil seed at the end of December and they were charging us twice?—When two crops are grown at the same time, we only charge for one crop, whichever is of the higher grade.

35,180. Not necessarily whichever is cut first?—No.

35,181. *Sir Henry Lawrence*: If one of the crops takes a longer time to grow, then how do you charge?—The only such case I know of here is where *arhar* is grown with another *kharif* crop; they have both the same rate and, that one rate is charged for both.

35,182. *Sir Ganga Ram*: Perhaps the problem here is not the same as it is in the Punjab. There, in the *rabi*, we generally put in many things; for instance, we grow clover with so many other crops, and so they used to charge two rates for the two crops?—It is not done here.

35,183. As regards the rates, of course in Bombay they charge Rs.50 for sugarcane?—That is a different kind of sugarcane.

35,184. What is the amount of water required to mature sugarcane?—They take five waterings of about 4 to 6 inches each.

35,185. Five waterings will not mature sugarcane, will it?—It is sufficient here. At present, if you take the area under Sarda canal, half the area under sugarcane is not watered at all.

35,186. I want particularly to draw your attention to pages 32 and 33 of the Irrigation Report so that in future you may try to get many schemes passed?—We do do this at the present time.

35,187. Do you think that the extension of irrigation in this Province has to a certain extent ameliorated conditions here? Now that the Sarda canal has been commenced can you tell me whether that figure of ten years will be reduced to six or five?—I do not anticipate any change.

35,188. Therefore, it is all the more necessary to think out some method to get over the trouble of drought. Somewhere I have seen it stated that the United Provinces are always praying for drought so that the Canal Department may profit? Sometimes the zamindars do not take any water?—Yes; it is a fact that the people do not take water in many areas when there is a heavy rainfall.

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35,189. And your return is very low?—Yes, but Government makes up for that under land revenue. In such years, no remissions of land revenue are given and *taccavi* advances are not required.

35,190. Why I am giving these illustrations is because it is all the more necessary to protect your areas by some method, either by hydro-electric pumping schemes or by tapping subsoil water?—Yes, in the areas which need it and have already been tackled, but if you take the country which has not been tackled by irrigation, the area north of the Gogra river in Oudh, there the people are quite indifferent to irrigation.

35,191. Why?—Because in most of the areas they do not want it. Take, again, the district of Pilibhit; there, also, in many parts the people do not want irrigation canals.

35,192. Are you aware of what we are doing in regard to well irrigation in the Punjab? The idea is to keep the power in one place and to spread it by means of compressed air to different groups of wells which may be, say, about two or three miles apart. We are now generating enormous quantities of electricity in the Punjab, and the idea is, by means of this compressed air, to place *barani* lands under irrigation from subsoil sources. Have you studied the scheme recommended for hydro-electric power by Mr. Meares?—I have seen his recommendations, but we are always up against the economic difficulty.

35,193. Has any step been taken in this Province in that direction?—No steps have been taken because, as I said just now, we are up against the economic difficulty. The Government cannot afford at the present time to go ahead in this direction because it would not be a paying proposition.

35,194. It would certainly be paying for the country though not for the Government. If you apply the formula which is given on pages 32-33 of the Irrigation Report you will see that the Government will be forced to agree to that, whether it is directly paying or not, and therefore that scheme applies also to this hydro-electric power?—This Government cannot be regarded as lagging behind in this matter, because we are spending within ten years about 9½ crores of rupees on the Sarda canal scheme alone, and that is the most vital scheme at present. The Government cannot tackle other schemes until the Sarda canal begins to bring in revenue.

35,195. *The Chairman*: I think you might tell us definitely whether the formula to which Sir Ganga Ram referred is applied in every case, whether the scheme is protective or productive?—It is only applied in the case of protective schemes. It is only meant to be used in such cases.

35,196. You are familiar with the formula?—Yes. It is one of the appendices in our Irrigation Manual of Orders.

35,197. *Sir Ganga Ram*: Taking a section of the country, say, from your submontane tract right across, what is the fall in the water level?—In the country on the Sarda canal, in the upper reach, the spring level is rarely more than 15 feet below the ground.

35,198. I am afraid I have not made myself quite clear. Supposing you take a line of the levels from the foot of the hills, what is the water slope in the subsoil level?—It is very minute.

35,199. Is it not parallel to the level of the country?—Yes, slightly greater than the fall in the level of the country, so that the fall just under the hills may be, probably, about 15 feet per mile; a little bit further down it varies; for instance, 10 miles further down it will be 4 feet per mile; again, further down it would go down to 2 feet per mile, and here in Lucknow the fall is roughly 6 inches per mile.

35,200. That is the very thing which gives you an indication of the possibility of *karaz* canals?—Just as they have in the North-West Frontier Provinces?

35,201. Yes? And if you dig a tunnel across the water you come to the surface?—It is impracticable in pure sand.

35,202. But there is a possibility of it?—No, the fall in the country is not steep enough; you want very steep country to go in for that.

35,203. If you take the country with a slope of 4 feet per mile where the spring level is 15 feet down, how many miles of tunnel would be necessary to bring the water?—Three miles.

35,204. But it might not be pure sand?—That is what it is in most of the submontane country.

35,205. Have you made any soil survey to show what is the nature of the country?—Only for the Sarda canal.

35,206. The Sarda canal goes parallel to the Himalayas?—Not quite. It is at an angle.

35,207. We have been waiting for your promised note to see how far you have carried out the recommendations of the Irrigation Commission and how far you have not been able to do so?—That was submitted about one month ago to the Secretariat.

35,208. *Mr. Calvert*: Is that the report of the Irrigation Commission of 1901-02?—Yes.

The Chairman: We will come back to that subject towards the end.

35,209. *Sir Ganga Ram*: Can you say how much addition you have made to irrigation since this Irrigation Report was written?—Yes, we have done a tremendous amount since then.

35,210. The Irrigation Report shows that formerly six billion cubic feet were being used, and that Commission have recommended an addition of two billions?—I can tell you from our Administration Report what is the increased area of irrigation since then.

35,211. I want to know how much you have used of nature's gift?—I can get it worked out for you.

35,212. Thank you. You have a certain amount of tank irrigation?—The whole of Bundelkhand irrigation is tank irrigation.

35,213. Do they lift the water by power or are the tanks so situated as to give the water by flow?—It is done by flow.

35,214. Are there many sites on which you can expand that system of tank irrigation?—There is no difficulty of getting flow irrigation in Bundelkhand where the slope of the country is great.

35,215. There must be many places situated on low levels where you can do it?—It is possible in small areas.

35,216. You must get the idea out of your mind that the tank must be situated in such a place where flow irrigation can be done. We have investigated that point in the Punjab because the mere lifting of 8 or 10 feet makes not much difference?—It is done in small areas.

35,217. In your Province lift irrigation has not received the same attention as it has in the Punjab?—Because we go for the flow irrigation when possible and are generally able to give it when necessary. It has now been proved in the Punjab that it is not worth giving flow irrigation to any one because there is very much waste, and you must drive that idea out of your mind.

35,218. In one place you say 50 per cent. is lost by evaporation? Have you studied Kennedy's investigations?—Yes.

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35,219. He makes it 25 per cent?—Yes, but he wrote for the Punjab and I also said 50 per cent. because that is the figure in these Provinces to the outlet before water is admitted into the water courses.

35,220. Have you tried to line the canals?—The question of lining canals was taken up very carefully when the Sarda canal project was being prepared; that canal at the head runs through very porous soil and an estimate was got up for lining the main canal and 15 miles of two branches. It was found that the cost of lining would come to three crores of rupees and would not pay.

35,221. Do you know we are following another method now? We are putting a seepage drain parallel to the canal and pumping it up?—That can only be done in the case of stiff soils. We have no water-logging in these Provinces. This was considered in connection with the Sarda canal, and it may be necessary to do this if any sign of water-logging occurs.

35,222. The question of water-logging was fully considered in the case of the Sarda canal?—Yes. As far as we could do so.

35,223. Does any part of it go into embankments?—Yes, considerable reaches are embankments.

35,224. Those are the danger points?—We have been very careful, and on the Sarda canal we have allowed for a mileage of drains equal to half the mileage of distributaries.

35,225. You have not tried puddling?—We have never found puddling very satisfactory.

35,226. On account of the cracks?—Yes.

35,227. On page 19 of the Irrigation Commission's Report, it is stated: "In the alluvial tracts of Northern India, down the line of the Jumna river, the subsoil supply of good water is practically inexhaustible, and its depth generally moderate; the soil and subsoil also generally favour construction. It is difficult, therefore, here to place any limit to the eventual extension of well-irrigation, except the requirements of cultivation." To this remark I want to draw your attention, and I want you to consider the possibility of extending well-irrigation by a compressed air system on the co-operative basis. Will that be possible in these Provinces? You have a series of wells giving water in the case of drought on the co-operative system, without considering whether the water is given to this field or to that field. Will that be accepted by the people here?—The question has never been raised here as yet. I would like to point out that in the matter of canal irrigation this Province has not been backward. We have gone as far ahead as possible since the Report of the Irrigation Commission. Take the Bundelkhand area: everything recommended has been done there since that Report was issued. The Sarda canal was taken up since then.

35,228. You know that a paper was read by Mr. Marsh before the Institution of Civil Engineers about Bundelkhand, and he advocated the system of bunding fields? Has that been done?—An enormous amount has been done. Hundreds of field bunds have been put up.

35,229. In your Province do you insist on not leaving any land without being ploughed, in order to absorb the rainfall? Have you read my article on "Floods and their Root Cause" in the *Indian Engineering*?—I am afraid not.

35,230. What I recommended was that a law should be made that no land should be left unploughed, so that all the gifts of nature are utilised; that will reduce our floods and raise the subsoil water level?—We do not need that in this Province, except in very exceptional cases. The average

spring level in the whole of the Province, except on the banks of rivers, is less than 20 feet, and we do not want to raise it higher.

35,231. That is all the more reason why your well irrigation ought to receive special attention?—Quite; as soon as funds will permit.

35,232. For the proper distribution of water to the zamindars, have you designed any instrument or any other means so as to ensure that water is received at the tail end in sufficient quantities, and that the people at the tail do not suffer?—Distributary outlets of the required size are fixed at a certain depth below the surface, generally $1\frac{1}{4}$ feet below the full supply level, and the number of outlets are only just sufficient to absorb the full discharge.

35,233. Has a module not been found necessary in this Province? You know the A.P.M.? Have you followed that?—We have not found it necessary here; your outlets are very much bigger than ours. In the Punjab you go in up to something like 5 cusecs. Our standard outlet delivers only half a cusec; we rarely give an outlet which takes more than 1 cusec.

35,234. In your Province, do not the tail end people complain at any time that they suffer on account of lack of water?—We do our utmost to see that they do not suffer.

35,235. Have you not got any scientific design which will ensure that they will get a certain amount of water? You might study that question. We have given a lot of attention to it?—We have studied it for the last 50 years. Our system, I hold, is far in advance of the Punjab system. We do not give 5 cusecs to the cultivator to waste. Government looks after the water, and will not hand it over to the cultivator to touch until it is less than 1 cusec.

35,236. What duty do you get for *kharif* and for *rabi*?—It depends on what you call duty. If you take an outlet from a constant channel, we get as much as 300 acres per cusec.

35,237. For instance, if the rice area is 1,000 acres, how much do you allow for that?—We do not allow the people to irrigate more than 45 per cent., or, at the very outside, 50 per cent. of the land.

35,238. Therefore, your irrigation is also partly dependent on wells?—Yes.

35,239. Does that mean that you have no water to give to the whole lot of that land?—No. We could distribute water so as to give it to 75 per cent. or even 80 per cent. of the land, but then we would water-log the land.

35,240. Is that for fear of water-logging?—Yes.

35,241. What do you consider is the safe limit, above which water-logging is dangerous? Simply raising the subsoil water is not dangerous?—No, but if it rises to less than ten feet it will be dangerous.

35,242. Ten feet is the limit?—It is not the limit, but we do not like our subsoil level to rise above ten feet.

35,243. In the investigation of subsoil water-logging, have you found out any point at which the water in the subsoil flows directly towards the river, and does not rise any longer?—All our subsoil water is just the reverse of the Punjab. Yours flows from the river into the centre of the Doab, whereas ours flows from the centre of the Doab into the river. Before we started the Sarda canal, I went up to the Punjab to study the question there. I went over the different canals, as far as I could, and consulted every officer who could give me information on the subject. The Punjab

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conditions are utterly different from the conditions in the United Provinces. I think in time the Punjab will have to come to the United Provinces system, and not give water to more than 45 per cent. of the land, as soon as you have filled up your central subsoil basin. You are now giving water to 75 per cent. of your commanded area in many places.

35,244. We do 115 per cent.?—Yes, in many places you do it, but that cannot go on, or you will water-log the country badly.

35,245. *Sir Ganga Ram*: It has been represented to me by landlords here that they would like to have their water extended to a certain extent, because at present they have to depend a good deal on wells. Do you think they are not right in making that demand?—Take, for example, the Ganges—Jumna Doab; all the water at our disposal is being distributed as fairly as possible, but there are many tracts in that where we would like to extend it further.

35,246. But on page 158 of your note you say, "Thus on the Upper Ganges canal only some 1,100,000 acres are irrigated annually out of a gross command of 5,350,000, or 21 per cent."?—That is all. There are large numbers of small tracts which we would like to irrigate, but we have not been able to find water for it from any system.

35,247. You are not starving those people simply because of the fear of water-logging?—No.

35,248. Cannot the water be extended so as to make it available to more than 21 per cent.?—If we had sufficient money to do it, say by pumping from the subsoil back into the canal, we could then extend it. We have not got river water at present.

35,249. That shows that you lose water by seepage?—Yes; I think that is the case with every canal. We do not lose any more here than in the Punjab.

35,250. *Sir Thomas Middleton*: In reading your paragraph on research, it seemed to me that your most important requirement was a skilled and experienced editor of Indian irrigation experience?—Yes.

35,251. That is what you think is the first need in connection with research?—Yes.

35,252. There is a vast amount of information available that has not yet been digested?—Yes, and collated.

35,253. With respect to the character of the research required for irrigation, there are obviously certain things which could be attempted centrally, such, for example, as the devising of instruments and machinery for measuring and supplying water. But in listening to the interesting examination which has just taken place, it occurs to me that the essential problems of irrigation are local problems?—Yes.

35,254. All the wisdom of the Punjab, for example, would not solve the difficulties of the United Provinces?—No, nor those of the Central Provinces. We are all separate, but still there are general questions which affect us all alike.

35,255. But the essential work must be taken up locally?—I think the essential work should be taken up locally.

35,256. Even within a Province, if you take this one subject which you mention, the question of salt land, that may arise from very different causes, and could not be attacked by an institution which was not in possession of all the local information available?—No.

35,257. Dealing with the question of salt land, I have been asking myself to what extent central assistance could be given to problems of this description, and it occurs to me that there is one type of assistance which might be given: the investigation of salt land might require the assistance of an agriculturist and a chemist, who could be supplied locally?—Yes.

35,258. But it might involve questions requiring a knowledge of soil organisms?—Yes.

35,259. For that purpose it might be necessary to employ a number of specialists; possibly three or four types of specialists who have had special training and experience?—Yes.

35,260. It would help you if from some central source you were able to get such specialist officers to work at a particular problem?—Yes. Of course, when I wrote my note, I wrote it purely from the canal officer's point of view; I was not thinking so much of research with regard to soil analysis and such things as you are referring to now.

35,261. *Sir Henry Lawrence*: To what were you referring?—I was referring to the depth of water that we should give the crops, the methods of distribution and such things.

35,262. *Sir Thomas Middleton*: In another Province we had quite an interesting discussion as to whether the research work in connection with irrigation should in fact be under the Irrigation Department or under the Agricultural Department?—I certainly think all soil investigation should be under the Agricultural Department.

35,263. In this Province you have come to the conclusion that research work on irrigation might easily be separated?—I think the question of water distribution should be left to us, or, at any rate, the engineering side of it; but the Agricultural Department should tell us what depth of water is best for each crop, and the questions of soil analysis should be left to them.

35,264. *Mr. Calvert*: Who would deal with the movements of water in the subsoil?—It is very difficult to say which should take that up. We are confined to those areas of the Province which are already canal irrigated, while their activities extend over the whole Province.

35,265. *Sir Thomas Middleton*: At any rate, in your view it is a subject which would readily lend itself to division between two departments?—Yes.

35,266. And that no such difficulties as were represented to us in the case of another Province need necessarily arise here?—I do not see why they should arise or why we should not collaborate with one another and help one another.

35,267. *Raja Sir Rampal Singh*: You have stated that there are tracts where it is very difficult to build wells because the spring water is too low. Do you take that into consideration in building channels and distributaries with a view to seeing that those tracts where there is scarcity of water are supplied with distributaries, while not supplying distributaries in those tracts where wells can easily be dug?—The only tracts that I know of in this Province where it is very difficult to construct wells are in the rocky hilly country of Bundelkhand and in the sub-montane district just below the Himalayas where the spring level is so low that it is quite impossible to make wells. Just immediately below the hills every source of water is being tapped at the present time, and cultivation is only possible where that water can be given; that is a very small area. As regards Bundelkhand, we have tackled every big river there and put reservoirs on every big river; that is where our protective irrigation is all situated. I do not know of any other places where the spring level is so low that wells are impossible.

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35,268. So no enquiry is made about this matter. I find there are places where wells cannot easily be made because the wells and the lift are too costly, while there are places in the same districts where it is very easy to dig wells and irrigate the fields with well water?—There are certain places, especially in *khadir* lands, where it is very difficult to dig wells, where what in this part of the country is called *laowar* soil, which is very fine sand, mixed with clay. The result is that there is a very small yield of water, and the people find it very difficult to sink wells in such soil. But I have only seen that in *kharda* lands adjoining rivers; elsewhere they are able to sink wells.

35,269. I have a very small estate on which there are villages where a well costs about Rs.1,000 to construct?—Yes, that is where the spring level is 30 or 40 feet below the ground.

35,270. It is sticky soil which we call *muchalal*?—Yes.

35,271. On account of that we cannot build wells?—Yes.

35,272. So no enquiry is made as to whether certain tracts require more canal-carried water than others?—I think we have investigated the whole Province with a view to introducing canal water. If you could tell me of any tract such as you mention, I should be very glad to have it investigated.

35,273. You stated that in this part of the country fodder is not specially grown in the months January to April; but it is the practice, at least in Oudh, for *khashtkars* to grow fodder crops such as *juar* near their wells long before the ordinary sowing time, simply to supply fodder for their cattle. Is that not the practice where canals exist at present?—To a very small extent. I think, even in Oudh, the percentage of cultivation under such fodder crops is very minute.

35,274. I cannot say it is very extensive?—It may be a field in one village.

35,275. They always sow *gajer* (carrot) for the use of their cattle?—I can say that on the Sarda canal country not one village in ten has one field of *gajer*.

35,276. Do you know what are the average yields per acre of wheat in the Punjab and in the United Provinces?—I am afraid I cannot tell you about the Punjab; in the United Provinces, from irrigated land, I should say it is about 15 to 17 maunds.

35,277. As far as my information goes, the yield in the Punjab is much greater than in the United Provinces?—That I cannot say.

35,278. What is the spring water level in Rae Bareilly?—The average spring level is about 32 feet down.

35,279. *Professor Gangulee*: Do I understand correctly that you have no research station at all in connection with the Irrigation Department?—We have no research station.

35,280. In the provincial memorandum you say that this research should be conducted independently and not in co-operation with the Agricultural Department. Do you mean that the engineering aspects of research should be undertaken by you, and that the influence of irrigation on soils and on crops should be undertaken by the Agricultural Department?—I think that would be better.

35,281. You would not call that independently?—I should like both departments to co-operate; they should give us any information they obtain and we should give them any information we obtain. I think they should be responsible, shall I say, for research in such matters as soil and depth of water required by any one crop; we could try then to see how we can give exactly that depth and no more.

35,282. There must be co-operation and co-ordination between the two aspects of irrigation researches?—Yes.

35,283. Have you at the present time any knowledge of the losses due to percolation?—Yes, we have calculated it for a large number of canals; it depends on a very large number of factors; it depends on the depth of the spring level below the canal, the nature of the soil and the wetted perimeter of the canal.

35,284. Is it possible to devise means of passing the water through more quickly so as to reduce the loss?—We have found that if we increase the slope of our canals, the water passing quickly is inclined to carry down the silt instead of letting it pass into the pores of the soil, and we get greater losses; therefore we have flattened our canals in most places where they had excessive slopes; that causes the silt to settle at the bottom; the silt is then, by means of the seepage water, carried into and chokes the pores of the soil, with the result that after a few years the loss is greatly diminished.

35,285. Does the same thing happen in the distributaries?—Yes, we have got very flat slopes in our distributaries.

35,286. I want to ask about the rates, though it is not within our terms of reference. Have you any data as to the amount of canal water required to bring crops to maturity, because I see you base your rates on that?—We base our rates to a large extent on that; but it is, to a certain extent, fortuitous, because a valuable crop such as sugarcane needs more water, and the cultivator is able to pay a higher rate because that crop is more valuable.

35,287. On whose reports do you assess these rates?—The rates have grown up from experience. I think you have got a statement showing what our rates were in the old days; we have gradually found which crops should be encouraged by a lower rate. If we charge a high rate for a particular crop, it may prevent people taking the water, and they may sow other crops. If we find that is so, we lower the rate for that crop. For instance, gram only requires one watering, and a very low rate is charged. There is a higher rate for wheat, which requires more water.

35,288. Supposing I am using your water and I am growing sugarcane; who reports to you that I am growing sugarcane?—We have a revenue staff; from the day the canal is opened that staff goes round village by village writing up every field that is irrigated, the name of the owner and the class of crop.

35,289. When the crop is on the field?—Yes.

35,290. Irrespective of the yield or the profit?—Yes, that we cannot deal with.

35,291. Are these subordinate officials popular with the cultivators, or do you come across cases of cheating, bribery and so on?—There are cases of cheating and bribery, but whenever it is detected the offender is dismissed at once.

35,292. When you spoke of the crop yield as compared with that of America and Egypt, were you thinking of gross value?—Yes, the gross value.

35,293. Who finally pays the owner's rate?—The owner of the land, that is the samindar, pays the owner's rate.

35,294. I suppose eventually it comes from the tenant?—Yes, undoubtedly.

35,295. In your note you speak of the market value of water; it is not clear to me what you really mean by that?—It is very difficult to describe what is the market value of anything, but I suppose the nearest thing to

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the market value of canal water would be what it would cost the cultivator to get his water on the same field from elsewhere; in other words, to raise it from a well; but whether you can describe that as the market value it is rather difficult to say.

35,296. Is there any big scope for irrigation by tanks and bunds in this Province?—We have done a vast amount of that work, and there is still a large scope. Further expansion depends on the money that can be allotted. We have several schemes pending, awaiting the time when funds can be allotted.

35,297. We were told in other Provinces that the average cultivator has a tendency to use more canal water than he actually needs. Do you find that this is also the case in this Province?—That is the tendency here also.

35,298. Is any propaganda done to educate the cultivator on the danger of using excessive water?—We do our utmost to prevent him from doing so, to persuade him to divide his field into *kharis*, and as I have already explained, we have actually on two occasions instituted fines to force him to do so, but I am afraid it has had very little effect.

35,299. Have you no such thing as Irrigation Panchayats, or some such village organisation through which this propaganda work may be carried on?—No, no regular Irrigation Panchayat.

35,300. Turning to the question of research, you make a reference here to the Agricultural Department carrying out a variety of experiments in the field. Do you know who planned these experiments?—I take it it was the Director of Agriculture.

35,301. These experiments have an important bearing on the problems of irrigation. Were these experiments made in consultation with the Irrigation Department?—I do not know. I was on leave when this memorandum was prepared, but I believe the reference is to experiments done at the agricultural farms.

35,302. Do you know of any experiments being carried out in consultation with the Irrigation Department?—As far as I know, none has been carried out so far.

35,303. When tackling the question of formation of alkali deposits in soil have they never consulted the irrigation officers?—Not that I know of.

35,304. Turning to your precis, you say that modules are unnecessary here. Have you come to this conclusion after definite experiments?—We have experimented with the Kennedy module and we find no better results than our present system, because, as I have explained to Sir Ganga Ram, we hand over such minute quantities to the cultivator that the module is really almost unnecessary.

35,305. On page 157, you have explained what the chief duties of the research officer would be. Have you any idea as to how this object would be attained? You state that the chief duties of the research officer would be to keep in touch with modern irrigation practice, not only in other Provinces, but in other countries?—At the present time a large number of engineering papers are published, especially in America, and papers are written in other Provinces on hydraulics, and other matters in connection with irrigation. But these papers are not circulated; they are retained in their own Province. A research officer would get in touch with other Provinces and collect all such papers into a library where he would collate the material received.

35,306. Would this research officer be under the Central Government?—I think I have explained that in my reply. What we need is a Central Irrigation Congress, which would have its library at Delhi or some other central place. The librarian should be an irrigation officer of experience.

That officer would then collect all the information he can on the question of water-logging, subsoil flow, depth of water used by crops, what is done in America, and 101 other subjects. He should collect all the information he could and collate it in that central library, to which we could have access. When we started the Sarda canal, there was no place to which we could turn to to find out what had been done all over the world on the question of subsoil flow.

35,307. You want an All-India Irrigation Congress?—Yes, a Congress with a library attached, where officers would meet once a year under the direction of the Consulting Engineer to the Government of India, very much on the lines of the Punjab Congress, which has done an enormous amount towards advancing knowledge and science of irrigation and the flow of water. And then I would have research officers in each Province, looking into the questions that affect that particular Province.

35,308. Where are your subordinate officers trained?—Do you mean the revenue officer, or do you mean the engineer officer?

35,309. Both?—The lowest revenue officer is what we call a Patrol. His duties are to patrol the banks of the canal. He also writes up the irrigation as it occurs. We train him ourselves. He rises to the post of *amin*, who is the checking officer who checks the work of the patrol. Over him is the *zilladar*. He has, of course, a large number of *amins* under him. He, again, checks the work of each *amin* and is the revenue officer who prepares the assessment papers under the engineering staff. The engineering staff consists of the Subordinate Engineers who do all the actual construction and repairs. They are trained at Roorkee College to a large extent; as a matter of fact, almost entirely at the Roorkee College. Over them are the provincial service officers, i.e., Assistant Engineers, who also are trained at the Roorkee College.

35,310. Do you consider these *amins* ought to have a certain amount of training in agriculture? Would it be helpful?—There is a certain amount of direct recruitment of *amins* who have superior qualifications in the hope that we may eventually get a better class of *zilladars*. When recruiting these men, those who have passed an agricultural course are considered as most eligible.

35,311. From your note we find that you have come really to the limit of canal irrigation, and now you propose to extend the scope of your irrigation in other directions, e.g., well irrigation. Is that so?—I will not say that we have come to the limit, except where river water is not available.

35,312. As regards the major projects their limit has been reached?—Yes. There is only one more major irrigation project possible in these Provinces, and that is the Lower Sarda canal, which can only be built if the Upper Sarda canal proves a paying proposition.

35,313. Under these circumstances, why would you leave the question of utilising subsoil water to the Agricultural Department?—We only deal with a limited area of these Provinces. We might deal with them inside the canal area, but we have not officers all over the Province, but only where there are canals.

35,314. Is there any conflict from the point of view of revenue? Is there less revenue from well irrigation and more from canals?—There is no revenue from well irrigation at present: it is only from canals. Only private schemes have been taken up in the matter of well irrigation and Government help is given to the landowners.

35,315. Do you think there is much scope for well irrigation?—I think there is enormous scope.

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35,316. *Mr. Calvert*: Could you suggest a figure representing the minimum charge per acre irrigated sufficient to cover capital and recurring cost?—Do you mean a pumping scheme?

35,317. No, in your canal area?—It all depends on the cost of the scheme. We do cover the recurring cost except in Bundelkhand.

35,318. What is your minimum rate calculated to cover recurring and capital costs by area irrigated?—You must take up each canal separately. The Eastern Jumna canal pays very well. The Upper Ganges canal also pays, even at the present rate. But they each pay a different percentage, although the rates are the same. It depends on the capital cost.

35,319. I do not want your profits. I want your minimum charge calculated to cover your bare expenses, capital cost *plus* recurring cost?—You must know the capital cost. Capital cost depends on the nature of the canal to be built.

35,320. But for the canals already in existence?—We have numerous canals in existence, and each pays a different percentage with the same irrigation rates.

35,321. *The Chairman*: Can you give Mr. Calvert the figure for the Sarda canal if you have it with you?—You may say it is down to the bare limit; it will just manage to pay its way, and the irrigation rates differ for the different classes of crops. It is Rs.7.8 for sugarcane and Rs.4 for wheat.

35,322. *Mr. Calvert*: What is the minimum basic rate which would cover all capital and recurring expenses?—On the Sarda canal it is about Rs.4-8-0 per acre. After deducting all working expenses that will just about pay the interest charges.

35,323. Interest and all your recurring charges?—Yes.

35,324. That is to say the cost to you of irrigating an acre is Rs.4-8-0?—On the Sarda.

35,325. On the other canals is it similar or lower?—On the Eastern Jumna canal, built at cheaper rates, it is a little lower. On the Agra canal it is about the same.

35,326. Could you suggest a similar corresponding figure for working a well, Rs.20 an acre?—I think it is a little less than that; there again I am afraid it is only a guess.

35,327. What will be your minimum and your maximum for your water rate?—Rs.10 to Rs.15 an acre; but that is only guess work and would depend on the capital cost and nature of the scheme.

35,328. The actual assessment of your rate is done by your department?—Yes.

35,329. If that were transferred entirely from your hands to the Revenue Department, would you expect a loss of revenue?—I do not see why there should be exactly a loss of revenue.

35,330. The Revenue Department will get as big an assessment as your Canal Department?—We supply the water, write up the area and make the assessment; they do the collection of the money. If they were to write up the area also it might go down slightly, but I could not give a definite opinion.

35,331. Do you think it might go down sufficiently to change the classification of the work from productive to unproductive?—No, I do not think so unless the margin is very small.

35,332. Has any experiment actually been made in volumetric delivery of water?—None.

35,333. Does your department take any active measures to encourage the growth of sugarcane in preference to other crops?—No; it has increased of itself very amazingly of late years. Taking the Sarda canal area, Sir James MacKenna asked me the area under sugarcane when he presided over the Sugar Committee in 1918; the figure then given was 91,000 acres and at present though it is grown without the help of the Sarda canal water the figure according to the last year's crop report is 261,000 acres.

35,334. *Sir Ganga Ram*: Does that not show that the canal is not wanted?—That is a matter of opinion.

35,335. You say that you want five waterings for sugarcane over and above the rainfall?—Yes.

35,336. Supposing there is no rainfall, how much water do you require?—That I cannot say; such a thing has never occurred.

35,337. In certain Provinces I was told they give 140 inches of water for paddy. You cannot say how many waterings sugarcane would require if there is no rainfall?—The rainfall is 30 inches, and I take it we have to replace a large proportion of that rainfall.

35,338. Could you give us any information about paddy? I suppose it is not grown under canal irrigation in this Province?—Yes, a considerable area is grown.

35,339. Over and above the rainfall, how many waterings do you give?—Sometimes three waterings; it depends on the nature of the crop.

35,340. Have you any definite information about the line of wells below which you could not go?—You mean the greatest depression head? It depends on the nature of the sand.

35,341. If it is a good *mote*, up to what depth can they go?—I am afraid I cannot tell you; it varies so much.

35,342. Do you employ *zilladars* from the Agricultural College?—No; *amins* are appointed direct from the Agricultural College.

35,343. *The Chairman*: Over how many years do you spread your repayments for capital charges in the case of schemes called unproductive? What is the basis of amortisation?—I should not like to answer that question; the Finance Department deals with it; it has nothing to do with the Irrigation Branch at all. I believe in the case of the Sarda canal it is fixed for 80 years. Protective works have in the past been financed from funds given by the Government of India out of savings. The Sarda canal, as far as I know, is the only canal in this Province for which there is a sinking fund

(The witness withdrew.)

Lt.-Col. C. L. DUNN, D.P.H., I.M.S., Director of Public Health, United Provinces.

Note on the effect of Ill Health on the Agricultural Population.

1. *Relation of health to efficiency.*—*Mens sana in corpore sano* is a very well-known adage and epitomises the relation between health and efficiency. Ill health in all occupations is detrimental to efficiency so that there is a constant necessity to endeavour to reduce ill health to a minimum, before increased efficiency can be expected from the agricultural population.

2. *Chief causes of ill health.*—In the United Provinces, the chief causes of ill health are malaria, cholera, plague, small pox and other infectious diseases and the respiratory and intestinal diseases, but the great cause of ill health and therefore lowered output is undoubtedly malaria. Diseases such as cholera, plague and small pox are short in duration, and either result rapidly in death or recovery, and therefore have not got a very great effect on the output of the agricultural population. A high death-rate in a country does not necessarily react detrimentally on the efficiency of the workers in that country as long as the death-rate is not higher than the birth-rate. In the United Provinces the death-rate is on the average $2\frac{1}{2}$ times as high as it is in the United Kingdom, but as the average excess of the birth-rate over the death-rate is about six per mille, there is a natural increase in the population higher than in most western nations. There is, therefore, little, if any, shortage of labour in any of the districts of these Provinces. It is consistent ill health and the debility which arises therefrom that has the chief detrimental effect on the agricultural population, and malaria is the chief cause of chronic ill health and debility. There are also other causes of a minor character, such as tuberculosis amongst the respiratory diseases, dysentery and hookworm disease among the intestinal diseases, and I propose to confine my remarks chiefly to these important causes of ill health.

3. *Debility due to malaria.*—Malaria is prevalent all over the United Provinces, but in certain districts is very much worse than in others. According to the official returns nearly one million people die of malaria in the United Provinces every year, but these returns are exceedingly inaccurate, owing to the fact that the reporting agency in rural areas is the illiterate and usually ignorant village *chaukidar*. I have examined this question with care for the last five years, and by comparing the causes of death as checked by professional agency with the official agency, I find that it is probable that the actual deaths from malaria are under 100,000 per annum and that a large number of deaths which are attributed to malaria are really deaths from pneumonia, enteric fever, relapsing fever, dysentery and other diseases. There is no doubt, however, that most of these returned as dying from malaria were suffering from malaria or were debilitated from the effects of malaria. Malaria, therefore, is a great predisposing cause of death.

In a note to Government on the requirements of quinine of the United Provinces, I made a very conservative estimate that at least one-quarter of the population of the United Provinces had at least two attacks of malaria per annum, and that the percentage of people in which these attacks were properly treated by quinine was under 1 per cent. The result of this is that 25 per cent. of the population must have been incapacitated from work for at least two months of the year, besides having a lowered vitality for the rest of the year. The agricultural population of the

United Provinces is about 34,000,000, and of that 34,000,000 the adult population, both male and female, who work in the fields must be at least 18,000,000, and I calculate the loss of efficiency of these 18,000,000 owing to debility as at least 50 per cent. of their possible output.

There is little doubt that, if quinine in sufficient quantity were available in every village to treat all attacks of malaria, a great deal of this debility could be done away with. In 1921, the total supply of quinine available for all India was only about 160,000 pounds owing to the great shortage in the world supply, whereas in order to give each person who gets an attack of malaria in the United Provinces anything like an efficient quinine treatment, double this quantity would be required for the United Provinces alone. The chief requirement, therefore, at present, in the United Provinces is a very largely increased supply of quinine. It is also necessary that there should be, as well as an increased supply, a considerable reduction in the present price, which puts quinine beyond the pocket of the poorer classes. There is no doubt that were cheap quinine available in large quantities, it would be extensively used in every village, as the agricultural population are, for the most part, thoroughly aware of its value.

In addition to increasing the supply of quinine, much can be done by Government to reduce the incidence of malaria, but I am afraid that the cost of widespread anti-malarial measures in rural areas will be for a long time prohibitive, and therefore not practically possible. It is possible, however, to reduce the incidence of malaria by drainage, &c., in certain rural areas where the agricultural value of the land is high as well as the incidence of the disease, and it should be the policy of the Government, when funds are available, to gradually increase their grants for the purpose of undertaking anti-malarial measures of a permanent nature. There are other areas, such as certain tracts along the foot-hills of the Himalayas, where the cost of rendering these areas non-malarious would be so high as to render it economically impossible to produce good results. These areas should be evacuated and the land given back to the Forest Department. Major Phillips, Assistant Director of Public Health, Malariology, has submitted a full report to Government on this subject with regard to the Bhabar and Terai Estates, and has recommended that certain tracts be evacuated, where the death-rate has always exceeded the birth-rate, and probably always will.

4. *Tuberculosis*.—With regard to tuberculosis, which is fairly widespread in the United Provinces, but chiefly in municipal areas, the only thing that can be done is by education and propaganda to create a demand for better housing conditions. The chief predisposing cause in tuberculosis, as in all respiratory diseases, is overcrowding. For various reasons, climatic and otherwise, the people of India, during certain months of year, have the habit of living in small, dark and ill-ventilated rooms, with the result that during such seasons of the year, viz., the three coldest winter months and the three months of the monsoon, the incidence of respiratory disease is very high.

5. *Dysentery*.—With regard to dysentery, this disease is responsible for a great deal of morbidity in villages, and the chief causes are (a) impure village water-supply from shallow wells, and (b) faulty methods of storing manure, thus encouraging the breeding of large numbers of flies which carry the disease from infected excrement to the food of the people. The first of these causes, i.e., impure water-supply, is the chief cause in India of all infectious intestinal diseases. The average village well is badly constructed and faulty in site and thus is being continually polluted by the subsoil water, so a reasonably pure water-supply cannot be expected unless

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a very large amount of money is available. In certain large villages under the Village Sanitation Act, a certain amount of money from Government grants and from very small local taxes is available for this purpose; in such villages certain improvements are noticeable, but these villages contain a very small percentage of the total rural population. In other villages there is no local taxation, and therefore no funds are available to keep the village wells in proper order. Small grants made by the Board of Public Health for this purpose only affect an infinitesimal proportion of the villages, and it would require a very large sum of money to provide all villages with properly constructed wells. I do not see how it will ever be economically possible to supply these wells unless the villagers are prepared to be taxed in order that the necessary funds may become available. Apart from the initial expenditure required in most villages, the sums necessary for upkeep of the wells in each village would be exceedingly small and their provision is economically practicable.

6. *Hookworm*.—Hookworm is exceedingly prevalent all over the United Provinces. It is a chronic disease which causes anaemia and therefore debility in the infected individual to a greater or less extent. A report on the prevalence of hookworm in the United Provinces was submitted to Government in 1919 by my predecessor. As the result of the investigation undertaken, it was found that in eastern districts 86 per cent. of the population were infected and that the percentage infected gradually decreased in proceeding towards the west until the lowest infection was found in the Jhansi district. The reason for this is as follows:—

The eggs of the hookworm are voided by infected persons in the faeces, and as it is the common practice in all villages to use the fields for attending to the purposes of nature, these eggs are found in the ground. As nightsoil is also used as manure in the fields, agricultural land becomes infected and the young worms which are developed from the eggs find their way into human beings through the pores of the skin of the feet and developed into the adult worms in the intestine, thus continuing the life cycle. As the majority of agricultural labourers go barefoot they have no protection against being infected. In the eastern districts where the climate is damper than the western districts, these worms and eggs can exist for long periods in the ground, while in the western districts, owing to the drier climate, they are desiccated and die, and this accounts for the geographical distribution. The hookworms in the human body can be easily killed by thymol, but in order to sterilise the whole of the infected agricultural population, an enormous amount of thymol would be required. Even if this were carried out, the result could only be of a temporary nature as long as the people continue to work barefoot in the fields. It would not be possible to ensure the complete sterilisation of the whole rural population, so that the fields would again gradually become infected, and after a short period the percentage of infected persons would be again as high as ever. I, therefore, advised Government in 1921 that it would not be practicable to do anything effective to reduce hookworm in rural areas, but that it was quite possible and practicable in industrial areas.

7. *Organisation for measures of relief*.—No measures for ameliorating the health of the rural population can however be carried out with any success until a complete and adequate public health service is provided. Until the last few years, apart from the Director of Public Health, four Assistant Directors for general duty, and one for malaria work, there was no whole time public health personnel at all in the rural areas of these Provinces with the exception of the vaccination establishment and public health work was supposed to be carried out by the District Officers on the advice of the Civil Surgeons. Shortly after taking over my appointment in 1919, I impressed upon Government the necessity of establishing a Public Health Service for

rural areas, as it was quite impossible for the Civil Surgeon with his multifarious duties at the headquarters of the district to be able to advise and control all the necessary public health activities required to make the least impression on the great mortality and morbidity which prevails in all districts in these Provinces. Government accepted my views and during the last five years, as far as funds permitted, they have sanctioned district establishments of public health officials consisting of the skeleton organisation of a District Medical Officer of Health, and Assistant District Medical Officer of Health and one Sanitary Inspector per tahsil, together with various other public health officials in charge of public health travelling dispensaries and on special public health duty. Seventeen districts have now been staffed with this skeleton organisation, and with practically no exceptions, the Chairmen of District Boards and District Magistrates have eulogised the work of these officials, and there is no doubt whatever that they have been responsible for largely reducing mortality and morbidity. These officials are whole-time officers, and are on tour for the greater part of each month in the villages advising and controlling sanitation and prevention of disease.

An important part of their work has also been the work of educating the people in the methods of escaping the various prevalent diseases. For this purpose a permanent Hygiene Publicity Bureau has been established with the sanction of Government with a staff of two whole-time medical officers of health. The Bureau prepares simple lessons and stories on a large number of subjects connected with sanitation and prevention of disease. These stories and lessons are illustrated by large coloured posters and by sets of magic lantern slides. These posters, lessons and magic lanterns, together with sets of slides, are distributed to all Medical Officers of Health in towns and districts and in the travelling dispensaries, in order that they may be adequately supplied with suitable material for their propaganda work. A cinema and many films of public health subjects have been obtained recently, and exhibitions will be given at large religious and other gatherings at which the rural population congregate.

In order to further assist in propaganda work by illustrating bad and good sanitation and the prevention of disease under Indian conditions, a cinema camera has been obtained and arrangements are in train to take films in India for exhibition. This propaganda work is gradually being extended and developed with a view to creating a demand in the rural population for better conditions. I am firmly of the opinion, however, that the Department of Education should give much more assistance than they do at present to the cause of educating the people in hygiene, and I have on various occasions pressed Government to make the teaching of hygiene in all schools compulsory. Up to date, however, I understand that such teaching is only compulsory in the normal schools and not in the high, middle and primary schools in the Province.

It is the policy of Government to extend this organisation to every district in the Province as funds and properly trained personnel become available. The skeleton personnel sanctioned at present is merely a beginning, and it is hoped that the policy of Government will be to gradually extend the scheme until there is an adequate number of properly trained public health officials available for every tahsil and *pargana* in the Province. It is also essential that the whole of the superior public health personnel working in these Provinces should be organised and controlled by the provincial department, as in public health such important matters cannot be left to the vagaries of local bodies.

It is hoped that the whole of the rural areas in the Province will eventually be divided into compact areas in each of which there is a fixed dispensary for the cure of the disease and public health personnel for the prevention

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of disease. This system would do away with the necessity for travelling dispensaries which at present endeavour to cope with the absence of the properly equipped fixed dispensaries in many large areas in these Provinces. The provision of a fully equipped and fully trained organisation of this nature would enable the Public Health Department by propaganda, precept and example to create a demand among the rural population for better conditions of living and for many measures for the prevention of debilitating diseases being introduced, and I have also little doubt that in time their objections to increased taxation, in order that funds ear-marked for this purpose may be available, will come to an end. With such an organisation, the wide distribution of quinine for the treatment of malaria would be possible, anti-malarial schemes in suitable areas could be carried out, better housing conditions in villages for the prevention of tuberculosis could be provided, improved village wells could be constructed and better methods of storing manure could be taught to the villagers.

8. *Milk.*—In addition to the above causes of debility among adults, one of the great causes of death, illness and debility among children, which has undoubtedly a permanent effect on their physique through life, is the faulty and inadequate milk supply available both in towns and villages. This is a very important question, which under present conditions in India is difficult to solve. In my opinion, many years of propaganda work and education will be required before a demand for a pure milk supply is created. When created, one of the first steps to be taken will be for Government to try to improve the breed of cattle all over these Provinces. At present a large number of buffaloes and cows are kept in most villages, the great majority of which only produce an average of three to five seers of milk per day. These also are in such numbers that it is only in exceptional years that they can be adequately fed throughout the year, with the result that the villagers are impoverished by the amount of the fodder which these animals eat, and as this fodder as above stated is usually insufficient, the economic value both from the milk point of view and from their capacity for work is very low. In other words, under present conditions, the majority of the cattle in India are not worth their food. If, by the introduction of high class pedigree stock from other countries, the breed is improved, the capacity for work of the village cattle would be doubled and even trebled, and the number necessary to be maintained would be half or less than half the present numbers. This would result in there being an adequate supply of fodder for all necessary animals. The milk supply would be far greater than at present and more nutritious.

The next step necessary would be to educate the people in the cleanly collection and distribution of milk. At present all castes in India boil their milk before taking it and thus escape many of the milk-borne infectious diseases, so that this social habit is in a way hygienic. This is true, however, only as regards the adult population, as such milk, which has been boiled before the consumption is not a proper food for children. By boiling, the vitamins of the milk are destroyed, with the result that children fed solely on such milk, owing to the absence of the essential vitamins, become debilitated and ill nourished and develop diseases which often incapacitate them from full work throughout their whole lives.

9. To summarise the methods of increasing the output of the agricultural population from the public health point of view, we must have

- (a) an organised and educated public health service in all rural areas in these Provinces,
- (b) a central organisation to control the whole department and supply this personnel with all necessary educative and other material,
- (c) money to carry out all necessary works for the amelioration of village conditions.

The framework of the first two is in existence and only requires expansion, the third requirement is however being supplied at present in quite inadequate amounts, and until the amount of money available for public health is greatly increased little can be done.

Oral Evidence.

35,344. *The Chairman*: Colonel Dunn, you are Director of Public Health in the United Provinces?—Yes.

35,345. You have provided the Commission with a note of the evidence which you wish to give. Is there any statement of a general character that you want to make at this stage in amplification of that?—No.

35,346. You have given us a very clear outline of your views on some of the important problems coming within your responsibility. Have you attempted at all to assess the probable cost of some of these in relation to the financial possibilities of the immediate future?—With regard to the items in which I say that public health personnel must be widely distributed in all the districts in the Province, I can give you practically the exact figures.

35,347. Would you send those in*?—Yes.

35,348. I will take it it would be very difficult to assess the probable cost of an anti-malarial campaign on a large scale in the rural areas?—Very difficult indeed, but I can give you one or two cases of recent surveys in the rural areas. We have just finished one three months ago in a very intensively malarious town, Phulpur in the Allahabad district, with a population of about 6,000. We found that, owing to the large numbers of tanks and depressions and to the high subsoil water, drainage was extremely difficult, and the estimate of the Engineering Branch of the Public Health Department was about Rs.1,20,000 to fill up the drains and depressions indicated by the malarial survey. That was to the benefit of a population of 6,000, so when I received the estimate of the Engineering Branch I sent it on to the Government, and said that I considered it was economically unsound to spend such a large sum of money to benefit such a small population. An estimate for the same work in the town of Bareilly with a population of a lakh was about the same figure, and I recommended that we had better spend the amount of Rs.1,20,000 on Bareilly instead of on Phulpur.

35,349. I take it there is a certain recurring charge to be expected in the case of all these schemes over a series of years?—It is a much bigger question than that. I pointed out to the Government that at the present time it should be the policy of the Government to undertake such anti-malarial work as the finances of the Province permit. I pointed out that in a flat country like the United Provinces a great deal of filling in of depressions and hollows was needed; but even if works were carried out the villages were not likely to keep them up in the slightest degree, so that the same conditions were likely to occur in the near future owing to the social habits of the people. When they build a house they dig a hole to get the earth, and when they repair the house after the monsoon they do the same. I put the whole thing up to the Government, showing that rules and regulations should certainly be drawn up in every village or rural area in which we do any work; otherwise the whole of the money would be wasted.

35,350. Have you any views as to how the supply of quinine for India might be increased?—I believe there are certain areas that have been surveyed by the cinchona-growing experts. These areas are available in Madras, in the lower parts of Bengal, and in Burma, where there are very large areas indeed at present not used for any other purpose, but which could be used for the growing of cinchona.

* Not printed.

35,351. It is a substance which can only be produced in certain Provinces but is required by all the Provinces? Would you regard that as a good argument for placing the development of the quinine supply in the hands of the Government of India?—I think quinine supply should be altogether in the hands of the Government of India.

35,352. You have, I think, no Public Health Act in this Province?—No; we have a series of Acts which I have proposed to Government should be amalgamated into one Provincial Public Health Act. I consider that the first essential is a Public Health Act for all India.

35,353. I was coming to that. Have you advocated that publicly?—Yes, to my Government. I have also explained my views at conferences which have been held at various times at Simla and Delhi, and I know that one of the Public Health Commissioners to the Government of India, Major-General Hutchinson, who is now in Madras, drafted a Public Health Act, but the Government of India did not take it up. This view of mine was also shared by all the Directors of Public Health at the Public Health Conference held, I think, at Simla in May, 1919.

35,354. *Professor Gangulee*: And the Government of India gave no reasons for not accepting that Act?—I have no information. I was merely informed privately by Major-General Hutchinson that it was rejected.

35,355. *The Chairman*: I gather from your notes that you think the Education Department might be useful in spreading a knowledge of hygiene amongst the population? Are there any primers on health in use in the primary schools?—No, we have prepared several in my department and others have been prepared by other people, and these have been approved by my department. They are used as English readers, but not, as far as I know, in primary schools.

35,356. Do you think there is any scope in the primary schools for the teaching of simple health rules?—Yes, I think there is great scope.

35,357. Have you put that forward?—Yes.

35,358. Has it occurred to you that the co-operative organisation as it expands and becomes more vigorous might be a useful engine of propaganda in matters of public health?—Yes, it might be.

34,359. *The Raja of Parlakimedi*: Will you please tell me what is actually being done for child welfare in the United Provinces?—We have not come down to an absolutely standard policy yet, but the policy which I proposed to Government some time ago and which has been tentatively accepted is that all local bodies should be assisted financially and by technical advice to the greatest extent possible. Very few centres were in existence in the United Provinces up till about four years ago and any that were depended on the presence of some individual person who might be called a "live wire" and who kept it alive by raising subscriptions and getting money and starting new centres. I have found by experience that this enthusiasm disappeared as soon as the energetic person, the "live wire" withdrew. I have been trying to get a more standardised system of child welfare centres no longer relying on the energy and philanthropy of a single person, by starting more or less standardised committees in each of the large towns by virtue of the position of the person, such as the scheme that we started in Lucknow two years ago in which the Government through the agency of the Lady Chelmsford League promised a subscription of Rs.10,000 annually provided that the Municipal Board would put up a similar amount and provided also that the All-India Red Cross Society, United Provinces Branch did the same, and that the committees should consist of representatives of those that supplied the funds: in other words, that the Municipality would have, say, two members on the committee, the Lady Chelmsford League would have two members, the Red Cross would have two,

the general public would nominate two, the lady doctors in the town would nominate two and the treasurer should be the Executive Officer of the Municipal Board, while the secretary would be the Medical Officer of Health. This scheme was completely accepted and is running, and there are now five centres in Lucknow under a trained lady doctor who is in executive charge with a midwife attached to each centre and health visitors attending the centres. The scheme has now been copied by Cawnpore with certain modifications to suit local conditions, one of the subscribing bodies being the Associated Mills. I have just come back from Allahabad where they have agreed to a similar scheme, the only difference being that the Municipal Board demanded a bigger representation than we thought was commensurate with the amount of funds they supplied. The scheme is running in Bareilly on the same lines, and it is to be started in Benares. There are other small schemes which are still run on the old "live-wire" system at places like Agra, Muttra, Pilibhit, and so on, but they have not yet been organised on permanent lines. I do think that we are making an advance. I do not want complete standardisation, but I want continuity so that centres may go on functioning in spite of somebody being transferred or dying. The policy of the Government is to assist to the greatest possible extent, and more money has been asked for in this year's budget in order to extend to further centres, but the money must come partly from the Government, partly from the Municipal Board or District Board and the remainder from charitable organisations like the All-India Red Cross Society. As far as the Lady Chelmsford League in the United Provinces is concerned, it is merely a sort of disbursing agency. The money does not come from the Government of India or from the Lady Chelmsford League at all; it is simply voted by the Council and the local branch of the Lady Chelmsford League is used as their disbursing agency.

35,360. Do you maintain statistics of incomers in those baby centres?—Yes, they are published in my annual report every year.

35,361. And on that Board or advisory committee are you having any low-class people, people from the poor quarters, to see that these things are carried on efficiently? Actually the poorest or what we call the depressed classes get the full benefit of it?—The centre in Bareilly is now actually attending to nearly half of the children born there every year. In Allahabad also the conditions are similar. Practically all of the people attended to are of the poor class.

35,362. It is of course run on cosmopolitan lines?—Absolutely. The only thing is that some of the rich people who subscribe think that they ought to have their children attended free as well.

35,363. As regards the milk supply, do you see to that also?—Yes, the milk supply in the centres is above suspicion.

35,364. What are the sources of this milk supply?—The sources are many and diverse. I think I have mentioned the fact that there is one thing which saves the people, and it is the fact that they boil the milk. I think every caste in India boils the milk.

35,365. The people fear buffalo milk and therefore precautions would have to be taken to see that only cow's milk is supplied?—Buffalo milk is perfectly good milk. Of course it is not given to very young children because it is very strong, but it can be diluted with water and then given.

35,366. As regards midwifery, what assistance do the public get? Is there any organisation for this also?—Midwives are engaged by the centres and there is a Lady Medical Officer who is in charge of the whole organisation, each centre being supervised by her. She is the inspecting, controlling and consulting officer for both midwifery and health visiting.

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35,367. Is it your opinion that this work is getting more and more popular with the different local bodies in the Province?—Child welfare undoubtedly is getting more popular; the people are only too willing to take advantage of these centres. The new centre opened in Agra in January has had an attendance of 250 daily already.

35,368. Do you think that in course of time the whole Province will benefit by this?—I think so; but I am afraid the initiative must come from the Government at present. As time goes on the local bodies will take more and more interest in it. In Bareilly, for instance, to begin with, the Local Board would not subscribe anything; then they began by saying they would give Rs.500, and now their subscription has risen to Rs.1500, and for the following year they have, I believe, budgeted for Rs.3000.

35,369. What precautions are taken to assure village sanitation?—None. We cannot assure village sanitation.

35,370. Are not Municipalities and Local Boards taking any interest in that matter?—The Municipalities have nothing to do with village sanitation.

35,371. In Madras the municipal areas are spread over three or four miles, and there are people living just on the outskirts of those areas?—I see what you mean. We call these the suburbs, or *purwas* as they are known here. They are on the outskirts of the Municipalities. They pay the taxes if they come within the municipal limits, but I am afraid that they do not derive very much benefit from that. You have only to go round the outskirts of the big cities and you will find these areas very much neglected. They practically live under village conditions, as they do not get any lights or drains or things like that. I have brought this to notice in my inspection reports, but many Municipal Boards take no notice of that. You find the very same thing here in Lucknow. If you just go round the outskirts you will find that the people living round the outskirts do not derive any benefit whatever, at any rate not to the extent that they should.

34,372. The general condition is deplorable?—Yes.

35,373. *Sir James MacKenna*: Have you any Public Health Institute in this Province?—It is rising above the ground now. The foundations were laid about October. I started agitating for this in the year 1919 and the Hon'ble Minister persuaded the Council to give me the money for it last year.

35,374. Have you any officers of the Medical Research Fund working in the Province?—There are three.

35,375. What are they doing?—One is doing cholera research, one is on plague research. All three are Rockefeller Foundation scholars who went to America under the ægis of the Rockefeller Foundation and the majority of the expenses are being found by the Indian Research Fund Association. The other one is now in the regular line.

35,376. Where do they work?—There is a temporary building just about 300 yards from here in which they are working now.

35,377. How many Sanitary Engineers have you?—There is the Superintending Engineer, Public Health Department, and I think he has got four Executive Engineers under him.

35,378. Do you not think that it is rather an expensive luxury, I do not mean these officers' pay, but the schemes are apt to be very expensive from the Public Works Department and medical point of view?—I am allowed to go over the estimates from the sanitary point of view, but from the engineering point of view I cannot say anything.

35,379. This note* on malaria by Dr. Banerji left me with the question in my mind as to whether it is better that the population should die of starvation and thirst than of malaria?—Neither is necessary.

* See pages 195-202.

35,380. Where is Dr. Banerjee?—He is at present in America. He has also got a Rockefeller Foundation scholarship.

35,381. *Professor Gangulee*: What are the researches in which these men are engaged now?—Dr. Goyle is carrying out research with a view to endeavouring to find out a little more about the epidemiology of plague, beginning where the Plague Commission left off, and up to date we have carried out a complete seasonal and geographical distribution of all the rats and rat fleas of the United Provinces, which is a very complete work. We are endeavouring to find out whether the prevalence of certain rat fleas has any influence on the incidence of plague, either epidemic or endemic. It has been held by some authorities, notably the late Major Cragg of the Indian Medical Service and Dr. Hirst who is Bacteriologist to the Colombo Municipality, that a certain flea which was supposed to be a carrier of plague to a great extent was not so; but as far as we have gone, everything we have found out at present goes to prove that Major Cragg and Dr. Hirst are both wrong as far as this Province is concerned. This might be considered by you to be rather an academic research, but it is the foundation for carrying on future research.

35,382. Are you doing any research on diet?—Not any in this Province. We are relying on Colonel McCarrison.

35,383. You are in touch with him?—I hope to meet him every year, and I read his papers.

35,384. You have made a beginning with a public health service for rural areas, and you mention something about a skeleton organisation. Can you amplify your idea of such an organisation?—We have got a public health service in 17 districts out of 48.

35,385. What is the nature of that organisation?—The organisation consists of adding a District Medical Officer of Health to each district, and, according to the size of the district, one, two or three Assistant Medical Officers of Health, together with a Sanitary Inspector to each *tahsil*.

35,386. Are these Sanitary Inspectors trained?—Yes.

35,387. Are the Medical Officers graduates from the Lucknow Medical College?—They are more than that; they hold diplomas in public health.

35,388. What is the attitude of the local bodies to these organisations?—At first suspicious, now enthusiastic without exception; and the attitude of the District Magistrates and Commissioners is equally favourable. They have said that they were somewhat sceptical at first, but even the most sceptical have given in and admitted that the work that is being done has been of great benefit in the rural areas, especially in the nipping of epidemics in the bud before they have spread.

35,389. You have a Village Sanitation Act here?—Yes.

35,390. Is it functioning?—It is applied to certain villages.

35,391. How is that?—I have forgotten the exact reading of the Act, but I think that to villages with a population of over 2,000 the Act is applied on the advice of the District Magistrate, after he has consulted the people, and they are willing to come under the Act.

35,392. You talk about a proposal for a permanent Hygiene Publicity Bureau. Has it been established?—It has, and has been sanctioned as permanent by Government.

35,393. Do you get any assistance from non-official agencies in these matters of health propaganda?—We have *Seva Samithis*, and they are of help, especially in the large religious *melas*, but I find that they are like what I said about the child welfare enthusiasts. It is a matter of the personal factor, not the settled policy of a body. It is a matter of

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somebody with a personal interest; when there is such a man the *Seva Samihis* becomes energetic, otherwise it fades away and drops the subject.

35,394. What is your organisation for collecting vital statistics?—It is exceedingly bad; in the Municipalities it is all right, but in the villages it depends on the village *chaukidar*.

35,395. Have you any scheme for subsidising medical practitioners in rural areas?—Yes. It is not under my control, but I know of it. It is under the Inspector General of Civil Hospitals. Up to date, I am given to understand, the response has not been very good, and in spite of the subsidy it is very difficult to get medical graduates to go and practise in rural areas.

35,396. Do you associate malaria with irrigation?—Very much so.

35,397. That has been your experience here?—Very much so.

35,398. And with defective embankments?—Undoubtedly, chiefly from seepage, and, in the past (I do not say now), by canals sometimes crossing the natural lines of drainage without sufficient syphonage under the canals to allow natural lines of drainage to flow. In the case of the Sarda canal, that has been gone into very carefully indeed, and I think there will be no holding up of the natural lines of drainage of the country at all by the Sarda canal. The Department of Public Health was very carefully consulted on the whole matter.

35,399. In the note by Dr. Banerji which has been submitted to us, one of the measures which he suggests is a survey of existing embankments. It occurs to me that, supposing you do make a survey of the existing embankments, can you possibly remedy the evil already done?—Yes, I think in many cases it has been done. For example, the banks of the canal at Roorkee have for miles together been made of *pucca* concrete, simply to prevent seepage, and in one or two other malarious places the Canal Department have made the banks of the canal *pucca* to meet our views.

35,400. As regards malaria, I think mere distribution of quinine will not solve the problem; what is your view?—I am inclined to think that there is a great deal in the distribution of quinine. I would not like to dogmatise on it, but I think that, if quinine were available in the Province for every person who has got an attack of malaria and that person took it, malaria in these Provinces could be reduced by 60 to 70 per cent. in three years, because it is perfectly obvious that the reservoir of malaria is the human being, and, if you reduce the amount of parasites in his peripheral blood, the mosquitoes will become far less infective.

35,401. You talk about a central organisation to control the whole department and supply its personnel with all necessary educative and other material. What would be the nature of this organisation?—Public health is not a provincial matter, it is not a local matter; it is a matter of Imperial and international importance. My own private opinion is that, at the present moment, the local bodies are given far too much scope; in other words, they are not required to do certain essentials. I mean by local bodies the Provincial Governments, Municipalities and District Boards. There are too many permissive clauses in the present rules, and I would like to see a lot of the present rules altered. I have submitted proposals to Government on this point, and I must say that they have been received in a very good spirit. Government, as far as I am concerned, are in agreement, and it is only a matter of policy as to when a little strengthening of the Acts will be taken up. I think that there should be a Public Health Act for the whole of India, enjoining certain things on the Provinces as well, in order that public health may be treated from an Imperial standpoint, and in order that there may be co-operation and co-ordination.

* See Appendix, page 202.

There should be certain minima which must be carried out by each Province and, *ipso facto*, by each District Board and by each Municipality.

35,402. You would have an All-India Public Health Act and also a central organisation?—Yes. I think that in public health, the control of the Government of India as to certain essential minima should be greater than it is now. The control of the Provincial Governments over local bodies should be very much greater than the control we now have over the local bodies here.

35,403. With a central organisation like that, would you be able to co-ordinate the activities of all the Provinces in matters of public health?—Yes.

35,404. *Mr. Calvert*: Have your district health staff any powers to enforce their advice in villages?—The only power they have is voluntarily delegated to them by the Boards. Government have circulated every Board, on my advice, certain powers which they say should be delegated, both in cities and towns. As far as the cities are concerned, I am glad to say that practically every single one of them has followed up the advice of Government, and have delegated those powers. With regard to District Boards, the District Board Act has not been in force long enough yet, and the regulations and by-laws which are supposed to be made under many sections have not yet been made; but up to the extent possible I may say that the District Boards have delegated and do delegate the powers.

35,405. From your note, am I correct in gathering that you rely more on educating the people than on these powers?—Yes, at present, under the present rules. I would like to have the by-laws strengthened, but at present we have none in District Boards. We have to do our best by propaganda.

35,406. On the difficult and delicate question of expenditure on the prevention of disease and the cure of disease, are you satisfied with the present ratio?—No, certainly not.

35,407. You think that the public at large would gain better by a re-arrangement in your favour?—Certainly.

35,408. In this note on malaria, mention is made about paddy fields. We have had evidence that the malaria mosquitoes do not breed in the paddy fields?—They do not breed in some paddy fields. I shall give one example. Malaria mosquitoes do not breed where the soil is peaty. If there are peaty acids in the soil, no self-respecting anopheles mosquito will breed in it; the mosquitoes that breed there will be non-malarial. If there is alkali without any trace of peaty acids or vegetable acids formed from highly organic moulds, or if there is a lot of manure on the fields, the mosquito does not breed in the paddy fields; but if there is an alkaline soil and also low-lying areas filled with water, they do breed. For instance, in Saharanpur we found mosquitoes breeding in enormous numbers in the paddy fields. In parts of Bengal they do not breed in paddy fields, and certainly in Gorakhpur and places round there, we do not find them breeding in the paddy fields to any great extent. It depends, I think, altogether on the actual chemical reaction of the water.

35,409. In the same note it is stated that there is a considerable amount of evidence to show that railway construction has been largely responsible for increase in malaria. Do you know whether the Railway Board agree with that?—I do not know whether they agree or not, but I think everybody else does. There have been no rules and regulations about the proper construction of borrow pits; they have been doing it in a haphazard manner. It is not only railways, it is also roads. In addition to that, the railways sometimes run right across natural lines of drainage which have not been given sufficient outlets, in the same way as I said about the canals.

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35,410. In so far as malaria is due to railway embankments, that is a cause which should be capable of easy remedy?—Absolutely.

35,411. *Mr. Kamat*: With reference to the construction of wells in villages, do you think the method of construction is faulty and unhygienic?—It is certainly not hygienic.

35,412. In view of that, and in view of the fact that the construction of wells in villages is to be encouraged from the agricultural point of view, do you not think it would be a feasible proposition to enforce certain conditions through the revenue authorities before wells are allowed to be built?—I think you might ask *Mr. Pim* that. The revenue authorities are of course enforcing anything that the Government desire them to enforce, but I do not think from the point of view of policy they would enforce regulations which would seriously interfere with the social habits of the people.

35,413. But if your department suggest that certain hygienic conditions should be enforced in the interests of the health of the people, it would be very easy for the revenue authorities to see that those conditions were observed by the villages before constructing wells?—I do not think it would be easy. The difficulty there again is the social habits of the people; the well, according to their ideas, must be in a very accessible position, usually under a large tree with a platform round it in the middle of the village where in the evening they meet and talk on social matters; it is usually surrounded by houses with unhygienic methods of disposal of refuse, etc., with the result that those wells are almost invariably polluted. If one could get the villagers to sink the well far deeper than is necessary merely for the purpose of getting water, for instance, if one insisted that the pucca portion of the well cylinder should go down to a minimum depth of 50 feet from the surface, I would not mind where they put the well, because there would then be 50 feet of soil through which the water would be filtered before it got into the well. I should also like to have the well covered; we have undertaken great propaganda in these Provinces to get the people to accept a well with a permanent cover, such as a concrete dome with a pump in it.

35,414. In other words it becomes a choice between the hygiene of the well and the economics of the villagers?—Yes.

35,415. If the pucca portion of the well is to go 50 feet down, it will be expensive, and the villager regards it as essential to have a tree near the well for shade, though it pollutes the water?—He does.

35,416. Could you take a middle course and come to some sort of arrangement with the villagers by which hygienic wells could be adopted?—We have been asked to draft certain regulations on this very subject; as a matter of fact, I was drafting some rules yesterday. It was in issue as to whether the distance of the well from the nearest habitation in the village should be 50 feet or 15 feet; I was insisting on 50 feet, and my Secretariat friends asked whether I could not see my way to reduce the distance to 15 feet. I said I regretted I could not from a professional point of view.

35,417. You say the practice of boiling milk is good for adults from a hygienic point of view, but in the case of infants it destroys all the vitamins?—A great percentage of the vitamins is destroyed in milk by boiling; if the milk is merely brought to the boil and then allowed to cool off, the percentage of vitamins destroyed is smaller; if the milk is boiled for 10 minutes, practically all the vitamins are destroyed.

35,418. It seems to me it is a choice between two evils: if infants are given raw milk the chances of infection are great; if they are given boiled milk some of the vitamins are destroyed. Which of these two evils would

you prefer?—I would prefer them to do without the vitamins, because the number of infants who have to have cow's or buffalo's milk is very small; the majority are fed by the mothers.

35,419. So that the practice of boiling milk for infants must be tolerated?—It must be.

35,420. *Mr. Pim*: Reference is made in Dr. Banerji's note (see page 196) of the anti-malarial schemes adopted in Saharanpur; some years ago very severe restrictions were imposed as to canal irrigation in that district. Have those restrictions been maintained or modified?—In 1921, the Government, at the wish of the inhabitants of Saharanpur, allowed them to take up this irrigation again within a distance of, I think, half a mile. I regret to say they did not ask my opinion on the matter; I found out quite by accident that they had removed these restrictions; I promptly approached Government, and pointed out that the 3½ to 4 lakhs of rupees that had been spent in decreasing malaria from a spleen incidence of 84 to one of 7, which was an extraordinarily good result, would be wasted if the previous conditions were allowed to recur. The Government replied that this had been done for economic reasons, that the people had incurred a considerable loss owing to their not being allowed to grow crops on this area, and they asked me if I had any objection to this being done provided Government gave an undertaking that they would again impose the restrictions if I found the incidence of malaria again beginning to rise to alarming proportions. I said that if they could get an organisation that would see that all the canal water courses and *guls* were cleaned out every three months, kept straight and not allowed to be choked up with weeds as they had been before, in all probability the effect would be very slight and that in view of the economic conditions I would agree. That state of things exists at present; my malaria branch inspect the *guls* at Saharanpur once a quarter, and on their reports I keep Government informed. Up to date I have not found the necessity to recommend that the restrictions should be enforced; the water courses and *guls* are not kept as clean as they ought to be, but they are kept fairly reasonably clean, and they are not forming the breeding grounds for mosquitoes that they did before these restrictions were imposed.

35,421. You think this modified system works satisfactorily, provided reasonable care is taken in keeping the *guls* clean?—Quite satisfactorily.

35,422. *Sir Henry Lawrence*: I understand you have the support of the Legislative Council in your measures for public health?—I had in the last Council; a new Council has been elected and I have not raised the matter with them yet, but I understand, from what I hear unofficially, that they are quite favourable in every way.

35,423. Your grants have not been reduced as a matter of retrenchment?—No. As a matter of fact, I got a letter yesterday saying that in the debate in the Council last week the non-official members took exception to the delay in introducing the district health staff into every district of the Province owing to the lack of trained personnel; they asked whether it would be possible to do it if the Council were willing to supply the money to expedite the training of the personnel. I said of course it could, that I could easily hire further temporary buildings, employ more teaching staff, get further material, and instead of training in the restricted accommodation I have now eight or nine diplomates in public health every year, I could easily increase the number to 20, 30 or 40 if necessary, because the number of graduates wishing to come into the public health service exceeds the demand; I have a waiting list of 40 or 50 holding the degree of M.B., B.S. of Lucknow and other Universities.

35,424. Actually the grants you are getting for public health generally this year are 50 per cent. larger than last year; you have over 23 lakhs

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in the current year as against 15 lakhs last year. I have got the figures of your budget here?—I do not know whether I am getting it or not; we are asking for it.

35,425. This is your sanctioned budget for 1926-27?—Yes, that is as compared with last year; we added the district health scheme to eight districts during the year, and in addition we had increased grants for anti-malarial work.

35,426. In your opinion, is a fair proportion of this money being spent in the districts, or is it largely going to the cities? I think your grant for urban sanitation was raised from Rs.1,35,000 to Rs.4,41,000?—Yes, contributions to District Boards during 1926-27 are Rs.2,71,000; that is practically all rural sanitation. The plague budget is Rs.2,03,000; that is practically all rural. There is Rs.1,00,000 for malaria. So that Rs.6,00,000 out of the Rs.9,00,000 which I directly administer is being spent in rural areas. That is the part I directly administer; the Board of Public Health administers Rs.9,82,000 during this year. You have got the details of their grants but I have not; of their grants, I think, Rs.4,00,000 was municipal, Rs.1,00,000 was for pilgrim centres and Rs.1,00,000 was rural. The money for pilgrim centres is practically all spent on places like Hardwar, Muttra and Ajodhya.

35,427. Is the money spent on pilgrim centres recovered in any tax imposed on the pilgrims?—Not grants made by Government, but Municipal Boards such as that of Hardwar have a pilgrim tax which in the case of Hardwar is 2 annas on the railway fare of anyone coming in from outside a radius of 30 miles.

35,428. It is financed by a tax on the pilgrims?—Yes, except in the case of a big fair like the one this year in which Government have had to come to their assistance. They had Rs.1,50,000 accumulated funds from the pilgrim tax, but Government have had to give or lend them Rs.2,00,000.

35,429. Was there a discussion at a recent conference of public health officers regarding the value of quinine for prophylaxis?—I do not think so. I was at the conference in Calcutta in December last. It was not discussed there, nor at the conference the year before.

35,430. It has been suggested to us that the conference held last December passed a resolution that quinine had no value from a prophylactic point of view?—If that was so, it has slipped my memory.

35,431. Do you agree with that view?—I do not think quinine is any good at all for prophylactic purposes, so far as the general public is concerned. In jails and regiments, where there is discipline, the position is different.

35,432. The distribution of quinine you advocate is for curative purposes?—Yes. I say there should be at least 100 grains of quinine available for any man who gets an attack of fever. Relapses after 100 grains treatment in benign and malignant tertian fever are only, I believe, between 40 and 50 per cent.

35,433. Have you worked out what amount of quinine would be required for this Province on that basis?—I have made a rough estimate that at least a quarter of the population of the United Provinces get at least two attacks of fever a year.

35,434. You want 320,000 lbs. for the United Provinces alone?—Yes. The All-India supply is 160,000 lbs., but to give 100 grains for each attack of fever we should require at least that.

35,435. Does your department advocate the pasteurization of milk?—It is very good, but it is very expensive.

35,436. It is not possible for villagers to pasteurize their own milk?—No.

35,437. Why?—On the ground of expense. The pasteurizing plant costs a good deal of money, and there is no local taxation in villages.

35,438. If milk were pasteurized, you would then retain the vitamins and destroy the infectious germs?—Yes, it is, of course, quite possible for Municipalities like Lucknow to do it, if they only would.

35,439. It can be done in the big cities?—Yes, quite easily.

35,440. *Sir Thomas Middleton*: You have explained that the danger of mosquitoes breeding in rice lands is confined to the areas where the soil is alkaline?—Not altogether. I am not absolutely *au fait* with the question, and I do not think anyone has yet carried out research on this subject, to find out what is the exact chemical constituent in certain waters that makes them unappetising to the anopheles mosquito. We know, however, they will not breed in water where peaty acid is present.

35,441. The alkaline soils are to be found very largely in your own Gangetic tract, I think?—Yes. I have no doubt whatever that certain alkalines are equally repulsive to them.

35,442. Have you any information from other Provinces on that point?—No; I know of no research to ascertain the reason why certain paddy fields are not bred in by the mosquito.

35,443. With regard to sugarcane irrigation, where do you think the chief danger resides: in the field itself or in the water channels?—In the water channels, I think. I am not an agriculturist, but I have noticed from observation that in sugarcane irrigation the water as a rule does not lie on the ground long enough for the anopheles mosquito to breed in it.

35,444. Then, if the water channels could be properly attended to, there would be little risk from sugarcane irrigation?—Very little, I think. Under the most favourable conditions, from the time the eggs are laid until the adult mosquito comes out takes eight days, so that the mosquito requires clean, undisturbed water for eight days. If it does not get that it cannot breed.

35,445. *Sir Henry Lawrence*: Can you tell us why the Punjab leads all India in the matter of malaria infection?—I served in the Punjab myself for five years. I do not think it is the Punjab as a whole that leads in malaria infection; certain areas of the Punjab are practically non-malarious. There are other areas, however, where it is undoubtedly due to over-irrigation.

35,446. *The Chairman*: Would you like to see some research carried on on an All-India basis into the question of deficiency diseases?—Yes.

35,447. And into problems of nutrition generally?—Yes, I think that is very necessary. The work Colonel McCarrison is doing is excellent and very badly needed.

35,448. *The Raja of Parlakimedi*: Do the local boards take great interest in the supply of pure drinking water?—I do not know what you mean by "great interest."

35,449. Are they devoting a certain amount of their revenue to that object?—District Boards do very little; they practically leave it to the villagers. The villagers have to build, clean and repair their own wells. The Board of Public Health has made numbers of grants to District Boards for the construction of wells according to approved patterns, but our difficulty is to get them to spend the money. For example, even when a Board gets a grant of Rs.12,000 to build 20 wells, we often find they do not spend the money for months and even years.

35,450. Do not you earmark it?—Yes, they cannot spend it on anything else, but we often find that after two or three years only a portion of the grant, or perhaps none of it, has been spent. I do not think the District Boards under the present system have a proper disbursing agency

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for grants; they do not seem able to get proper technical advice or get hold of proper contractors for the construction of engineering works.

35,451. They are supposed to have an Engineer?—I am afraid some of the men with the District Boards can hardly be called Engineers!

(The witness withdrew.)

The Commission then adjourned till 10 a.m. on Thursday, the 3rd February, 1927.

APPENDIX.

Note by Dr. A. C. BANERJI, M.B., B.S., D.P.H., Assistant Malaria Officer, United Provinces, on "The Rural Malarial Problem in the United Provinces, with special reference to the Agricultural Population."

Malaria and agriculture.

The question of rural malaria is so closely bound up with that of agriculture that the one cannot be properly understood without some knowledge of the other. A close association has always been recognised between malaria and agricultural conditions, and it has long been known that a greatly increased prevalence of the disease almost invariably accompanies the decay of agriculture and the decline of cultivation.

In order to accurately estimate the effects of malaria on the agricultural prosperity of the rural population, it is essential that a survey of agricultural conditions both in malarious and non-malarious districts should be undertaken, along with investigations regarding prevalence of malaria. The necessity for such a survey will, I think, be readily admitted. The lines such a survey should follow must, of course, be left to the Health and Agricultural Departments. Without such a survey it is not possible to look at it from a statistician's point of view and to reduce the whole thing in terms of fall in revenue or in terms of untilled acres of land due to the effects of malaria.

I would therefore touch very briefly, on general lines, the question of incidence of malaria in the rural areas and the factors responsible for its prevalence.

Incidence of malaria in rural areas.

It is very difficult to get a correct estimate of the malarial incidence of any place in India from the present system of registration of vital statistics, because of the reporting agency. This difficulty is even greater in rural than urban areas. The reporting agency is an illiterate village *Chankidar*, and would record anything as malaria when the prevailing impression of a place is malarious. This impression, though it lacks the certainty of statistical data, is still of some value from the point of view of comparison.

The comparison in the annual mortality figures for malaria in urban and rural areas, according to the annual report of the Director of Public Health, United Provinces, is as follows:—

In 1920 the average for urban areas was 23·21 and for rural areas 31·31 per mille of population.

In 1921 it was 23·43 for urban areas and 30·48 for rural areas.

In 1922 it was 15·68 for urban areas and 20·35 for rural areas.

In 1923 it was 16·27 for urban areas and 17·26 for rural areas.

In 1924 it was 17·48 for urban areas and 21·13 for rural areas.

To have a death-rate, therefore, of anything approaching the figures quoted above, the case incidence of malaria must be extraordinarily high.

It has been estimated that a death from malaria corresponds to from 2,000 to 4,000 sick days, i.e., work-days lost. It would thus appear that the real importance of malaria as a burden upon the public is not reflected in the mortality returns, however useful these may be in indicating the intensity of the geographical distribution. The economic significance of malaria in areas where it seriously prevails is disproportionately great in comparison with the actual loss of life attributed to the disease.

Even relying on these figures for the sake of comparison, it will be evident that although malaria exists in towns it is very much more prevalent in the rural areas.

Spleen rates.

It is recognised that the splenic enlargement gives almost a true picture of the malarial intensity in a population.

The statement given below gives the comparative figures for some of the urban and rural areas of the United Provinces:—

A comparative statement showing spleen rate in some of the urban and rural areas of United Provinces

URBAN AREAS.

Name of the place.	Spleen rate.	Remarks.
Lucknow... ..	2.2 % (1913)	Result of anti-malarial measures.
do.	1.6 % (1923)	
Bareilly	3.6 %	
Pilibhit	5.1 %	
Meerut	5.9 % (1911)	
do.	1.3 % (1923)	do. do.
Moradabad;		
Municipality as a whole	44.9 %	
Centre of the town of Moradabad	6.6 %	
Outskirts of Moradabad	54 %	Here conditions are those seen in truly rural areas.
Saharanpur	78.8 % (1909)	Where extensive irrigation, rice and sugarcane cultivation and other rural conditions existed.
do.	7.3 % (1923)	As a result of stopping rice and sugarcane cultivation within a radius of 1 mile of the town and training the Dhamola and Pandohi rivers.
Nagina	79.1 % (1909)	Extensive irrigation. Tanks and borrow pits.
do.	13.49 % (1923)	As a result of anti-malarial measures.
Hardwar Union consists of 3 wards as under:—	32 %	No anti-malarial measures have been taken as yet and conditions here approach river-rain areas
Hardwar	60 %	
Kankhal	26 %	
Jwalapur	7.5 %	

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RURAL AREAS.

Name of the place.	Spleen rate.	Remarks.
<i>Railway areas.</i>		
Moghal Sarai	62.8 %	Due to large number of railway borrow pits.
Moradabad Railway Area ...	88 %	do.
Lhaksar Railway Area ...	33 %	Large number of borrow pits flooding from the Pathri river.
<i>Riverain tracts of certain districts.</i>		
Moradabad Riverain in villages	91.7 %	Due to extensive flooding during and after the rains.
Bareilly-near Ramganga river	14 %	
Bara Banki District riverain areas	30 to 80 %	
<i>Rural areas under extensive irrigation.</i>		
Tarai and Bhabar estates:		
Gadarpur Tahsil	89.1 %	
Bazpur Tahsil	65.6 %	
Kicha	68.7 %	
Haldwani	12 %	Not much canal irrigation.
Kathgodam	17.6 %	
Kosi-Kalan (Dist Muttra)	81.3 % (1910)	
do.	42.5 % (1923)	Result of anti-malarial operations.
Kirthal District Meerut ...	18 %	
<i>Other rural areas.</i>		
Basti Town Area (district Basti)	12 %	
Phulpur Town Area (District Allahabad)	23 %	
Some of the eastern rural areas where there is not much canal irrigation:		
Jaunpur District	3 % (1914)	
Sultanpur District	62 %	
Benares District	57 %	

" Observations on the spleen rate.

" (1) It is higher in rural areas than urban areas.

" (2) In smaller towns such as Saharanpur, Nagina, Hardwar and Moradabad, where conditions approach those seen in rural areas, the spleen rate was 78.8 per cent., 79.1 per cent., 60 per cent. and 44.9 per cent. respectively—a much higher index compared to the more modern towns such as Lucknow, Meerut, Bareilly and Pilibhit, where the spleen rate was 2.2 per cent., 5.9 per cent., 3.6 per cent. and 5.1 per cent. respectively.

" (3) The centre of the town, which is at a distance from the breeding grounds, suffers less from malaria than the outskirts, which are close to the breeding grounds. This fact was strikingly demonstrated in the investigations carried out at Moradabad and Lucknow; whereas the spleen indices in the heart of the cities of Moradabad and Lucknow were 6.6 per cent. and 2.2 per cent. respectively, the average figures for the outskirts of the same town were 54 per cent. and 25 per cent. respectively.

" (4) It is higher in places under extensive irrigation and rice cultivation, such as Saharanpur, Nagina, Kosi Kalan and Kirthal.

" (5) In the areas at the foot of the Kamaun Hills, known as Terai, which are water-logged and are under extensive irrigation and rice cultivation, and where there is no proper drainage, the spleen index is very high, averaging from 12 to 90 per cent., depending on the amount of irrigation, rice cultivation, and proximity to the hills and forests.

" (6) The big railway centres, such as Moradabad, Moghal Sarai and Lhaksar, which abound in countless borrow-pits, present very high spleen indices, e.g., 88 per cent., 63 per cent. and 33 per cent. respectively.

" (7) The riverain areas in the districts of Moradabad, Bareilly, Bara Banki and Saharanpur (Hardwar) have a high spleen rate, averaging from 14 per cent. to 91.7 per cent.

" (8) The eastern portion of the United Provinces was more lightly affected by fever than the western United Provinces, as will be seen from the spleen indices for Jaunpur, Sultanpur and Benares districts, which were 3 per cent., .62 per cent. and .57 per cent. (1914) respectively.

" (9) The west of the United Provinces contains much canal irrigation, which is usually associated with a high malarial index, but there may be other reasons.

" (10) By prohibiting canal irrigation, cultivation of rice and sugarcane crops, and by cutting water channels and certain other anti-malarial measures, the spleen rate was considerably reduced in Saharanpur, Nagina and Kosi, as will be seen from the above statement."

Factors responsible for the prevalence of malaria and how to deal with them.

They are chiefly those that afford facilities for the breeding and multiplication of anopheline mosquitoes, and of these there are many in any village of the United Provinces; the principal ones being tanks, brick-kiln excavations, railway and road borrow-pits, railway and other embankments, *katcha* wells, canal irrigation, certain wet crops like rice and sugarcane cultivation, and floods.

(1) *Tanks*.—There is usually, if not universally, a tank or a series of tanks within a few yards of the village precincts; these are formed by excavations of earth for the construction of the mud walls of the village huts. Some of these are shallow, but most of these are deliberately deepened to hold water throughout the year for watering cattle and other domestic purposes. These are potential breeding grounds for anopheline mosquitoes and one of the chief sources of malaria to the inhabitants of the village.

To get rid of these tanks wholesale will be a great hardship on the villagers and would meet with strong opposition, as they have existed for centuries and are now looked upon as a part of the village itself. They are

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also of considerable utility to the people for watering cattle, etc., and in some parts they serve as irrigation reservoirs.

The first step in any thorough antimalarial campaign will be to fill in all tanks within half a mile of any inhabited area, but, judging from the local conditions, it would be almost prohibitive to fill in all tanks. The minor tanks, hollows, depressions and ditches should be filled in. The big ones should be deepened, the earth so removed being used to fill in the minor depressions, and the edges should be kept free of grass and weeds, and should be straight cut and not shelving.

This is not a policy of perfection, but would, if carried out successfully, ameliorate conditions to a great extent. Villages which abound in countless tanks and *jhils*, cannot be improved and should be condemned and removed to suitable sites where better natural drainage exists. The earth from these condemned areas may then be taken to build up new huts for villagers. There is no paucity of land in India and it might be worth while to try this experiment. It might entail some expenditure on the Government in the way of compensation to villagers, but be well paid considering the prosperity of the agricultural population, which would eventually bring in more return for the money spent by an increase in the revenues.

(2) *Brick-kiln excavations.*—Half a mile may be regarded as the limit of flight of a mosquito, and no kiln excavations should be permitted within this distance from a village. This should not be difficult if a bye-law on the subject were passed by the District Boards. Such a bye-law exists for urban areas, and there is no reason why this cannot be enforced in rural areas in the interests of the health of the villagers.

(3) *Railway and road borrow pits.*—It has been shown that important railway centres such as Moghal Sarai and Moradabad, which are in close association with borrow pits, are intensely malarious.

The whole system of railway construction is wrong. Not only do the raised embankments interfere with the natural drainage of the country, but earth is taken for these embankments from too limited an area, resulting in a series of borrow pits of varying length, breadth and depth, which fill up with water during the rains and become mosquito-breeding grounds for varying periods after the monsoons.

This error has already crept in, and it is very difficult to get the railway authorities fill up these owing to the prohibitive cost. There is no reason why such a thing should be allowed to continue in the new railway constructions, and the only way to effectively stop such a practice is by legislation on the subject.

As for the existing ones, the only remedy lies filling up the borrow pits in all important railway centres and near big towns. In other places where series of borrow pits exist, it will be a sound policy to have a central *katcha* drain in the line of natural drainage passing from one end of the series to the other and falling into a deep pit, the earth from which may be taken to re-align the drain. This method will drain off the water from the borrow pits into the deep pit and reduce the surface areas for mosquito breeding to a great extent and would thus reduce considerably the mosquito population of the neighbouring area.

If possible, these deep pits may be stocked with larvicidal fish and tadpoles, which would eat up the anopheline larvae and would thus help in reducing the mosquito population still further.

The road borrow pits.—These result from excavations of earth taken out to repair the roads, and for this the P.W.D. is responsible. These, I think, are necessary, but should be very shallow, not more than 6 inches to 1 foot deep, so that any water collected may dry up soon after the cessation of the rains.

(4) *Wet Cultivation. Rice and sugarcane.*—In rice and sugarcane areas, every available piece of ground is a rice or sugarcane field, and these fields absolutely surround the village. These are very profitable forms of cultivation and also a fruitful source of malaria, for they need constant watering and in fact are grown in water.

These, if possible, should be prohibited within half a mile of any inhabited area. There is no objection to replacing these crops by dry crops such as wheat, barley and maize in these areas, and this, if enforced, will, I presume, not meet with much opposition, as the villagers will be able to carry on some sort of a cultivation near their dwelling-houses.

(5) *Railway and other embankments.*—The increase of malaria that almost invariably follows the embanking of areas is due to the interaction of a number of factors, most of which have a direct bearing upon the breeding of anopheline mosquitoes.

The construction of embankments, apart from interfering with the natural drainage of the country, leads to a great amount of excavation, and the resulting borrow pits afford additional breeding places for anopheles.

There is considerable amount of evidence to show that railway construction has been largely responsible for increase in malaria. Before the advent of railways, there were few roads, and although river embankments existed in certain districts, they were rarely efficient in preventing inundation, because breaches were common, and more often than not the embankments were deliberately cut to let river water on to the fields. As there were few roads to impede the free passage of the floods across the surface of the country, the water flowed from field to field in the natural line of drainage and eventually escaped into permanent water courses such as streams, rivers, &c.

But this natural process of flood and flush was destroyed by the advent of railways which required embankments for their tracks and a system of feeder roads to convey passengers and produce to their stations, and in consequence flood water was shut out from the country, the natural system of irrigation was interrupted, drainage was impeded and the network of channels which used formerly to be fed by the spill water from the great rivers became silted up, and in many cases entirely destroyed.

All this resulted in appalling epidemics of malaria, a serious decline of agriculture and the progressive depopulation of the affected areas.

But railways and roads are also of vital importance as they play an important part in the social and commercial organisation of the country, and they will be needed in increasing numbers as development proceeds. Railways, when properly designed with due regard to the physical peculiarities of the country, so as not to interfere with the irrigation and drainage so vital to the agricultural prosperity of the country, are of inestimable benefit. Lower Egypt is a striking example of this. This tract contains 3,100,000 acres of cultivation and no less than 2,400 miles of railway and 1,250 miles of raised roads.

Irrigation projects also require the embanking of the rivers in order that they may be adequately controlled and their waters properly utilised.

Railways, roads and river embankments are necessary therefore and must be provided for if future progress is to be assured, always remembering that they must take their proper place in the whole scheme of organisation.

(6) *Katcha wells.*—Where no canal irrigation exists the villagers resort to lifting water on to their fields from shallow *katcha* wells. When such wells are in frequent use, they do not afford much facility for breeding of mosquitoes. But for every such well in use there are several old and disused ones which fill up during the rains and hold water sufficiently long to produce many thousand mosquitoes. If these are within the range of half a mile of a village, they are a source of danger and should be closed.

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(7) *Floods.*—Inundation by flooding from rivers is more extensive and more lasting in rural than urban areas as there is no proper system of drainage. The water stagnates until it is evaporated by the drying action of the sun and wind. During this period, mosquito breeding goes on unchecked, and if suitable meteorological conditions exist, malaria in epidemic form is the usual result.

There is no solution of this trouble except to concentrate our efforts in helping nature when the flood has subsided. It might be possible to drain off this water on to a larger area and so allow of more rapid evaporation.

If an epidemic of malaria is feared in such cases, oiling should be done on a large scale to kill off mosquito larvæ and travelling dispensaries should be detailed to distribute quinine amongst the sufferers.

(8) *Canal irrigation.*—It has been shown that places where extensive canal irrigation goes on have a high spleen index, such as Saharanpur, 78.8 per cent. (1909); Nagina, 79.1 per cent. (1909); and Kosi-Kalan, 81.3 per cent. (1910), and some of the tahsils of the Terai and Bhabher Estates.

The pecuniary advantages of canal irrigation, both to Government and to the farmer, are fully recognised, and are so well understood by the cultivators themselves that they would willingly take their chance of the contingent evils of irrigation in order to secure its benefits.

It must be admitted that canal irrigation is a great boon to the Province, without which the large tracts of land now under cultivation would have remained fallow, but is not an unmixed blessing.

The Eastern Jumna Canal or Saharanpur Canal furnishes examples of some of the best and worst results of canal irrigation. In the north and south divisions where the soil is light, the drainage perfect, and irrigation carried on chiefly by Rajbuhars, there exist all the blessings and scarcely any of the evils of a canal. But in the centre division, where the drainage of the country has been greatly obstructed and the soil is generally more stiff and clayey, the adverse effect on health is marked.

From various enquiries on the existing canals, it has been found that salubrity depends in a great measure on the nature of the soil and the efficiency of the surface drainage.

It would thus appear that if attention to drainage be made an absolute condition of participation in the benefits of the canal, an improvement rather than a deterioration of the general salubrity may, in many instances, follow canal irrigation.

The main canals and main distributaries are harmless enough except in so far that in some places they interfere with surface drainage and tend to raise the spring water level in the areas through which they pass, but the smaller channels, *guls* and *colabas* which finally conduct water to the fields are generally found to contain anopheline larvæ.

The main channels are under the charge of the Irrigation Department, and these are generally well looked after and free from danger, but the smaller *guls* and channels seem to be under no one's charge and are frequently overgrown with grass and weeds and choked up, and these afford suitable breeding grounds for anopheline mosquitoes.

If it is not possible for the canal authorities to take over the upkeep of these *guls*, the villagers concerned should be made definitely responsible for the portions of the *gul* that irrigates their fields. If necessary, a bye-law should be framed on the subject, with a penalty clause, and the punishment here should be the stoppage of water for a fixed period.

Summary of Measures.

Briefly summarised, the measures that must be adopted to avert the spread of malaria are as follows:—

- (1) Prohibition of further embankments, tanks, brick-kiln excavations and borrow pits, &c.
- (2) Survey of existing embankments and their waterways.
- (3) Survey of river channels and other watercourses, with special reference to the drainage of the country.
- (4) The mapping out of local spill areas and lines of drainage.
- (5) Improvement of existing water channels.
- (6) Examination of the local water-table.

In addition to the measures enumerated above, an attempt must always be made to determine, as accurately as possible, the existing conditions in respect both to malaria and agriculture.

Enough has been said to show that the prevalence of malaria in rural areas is inextricably bound up with agricultural decline, impoverishment and depopulation.

The amelioration of malaria in urban areas and in some of the progressive portions of the rural areas in the United Provinces is a relatively simple problem. In these areas much may be hoped from specific anti-malarial sanitation, whether aimed at destroying the parasite with quinine or the anopheles mosquito, and the results of such measures may be expected to be directly proportionate to the expenditure incurred.

But the question of the rural anti-malarial problem is an extremely difficult one. Financial considerations at the moment stand in the way, so that these measures cannot be applied at present on a scale commensurate with the evil they are designed to remedy; nevertheless, they must be given their place in the plan of campaign, and it is to these measures that we must eventually look for the final triumph over malaria.

Thursday, February 3rd, 1927.

LUCKNOW.

PRESENT:

THE MARQUESS OF LINLITHGOW, D.L. (*Chairman*).

Sir HENRY STAVELEY LAWRENCE, K.C.S.I., I.C.S.	Mr. H. CALVERT, C.I.E., I.C.S.
Sir THOMAS MIDDLETON, K.B.E., C.B.	Raja Sir KRISHNA CHANDRA GAJAPATI NARAYANA DEO OF PARLAKIMEDI.
Rai Bahadur Sir GANGA RAM, Kt., C.I.E., M.V.O.	Professor N. GANGULEE.
Sir JAMES MACKENNA, Kt., O.I.E., I.C.S.	Mr. B. S. KAMAT.

Mr. A. W. PIM, C.S.I., O.I.E., I.C.S. } (*Co-opted Members*).

Raja Sir RAMPAL SINGH

Mr. J. A. MADAN, I.C.S. } (*Joint Secretaries*).

Mr. F. W. H. SMITH

Mr. H. A. LANE, I.C.S., Revenue and Judicial Secretary to
Government, United Provinces.

Replies to the Questionnaire.

QUESTIONS 5 AND 6.—FINANCE AND AGRICULTURAL INDEBTEDNESS.—The questions asked under these heads raise the fundamental problem of the position which Government should occupy in the general scheme of agricultural finance. Should Government extend their lending operations so as to compete with the professional moneylender and so force down his prices and, if possible, oust him? Or should they confine themselves mainly to making the scales as little weighted as possible against the borrower? Money is now lent by Government in the form of *taccavi* for two different purposes. The first is to give temporary relief in abnormal conditions such as drought or flood. For this purpose *taccavi* is given under Act XII of 1884 for the purchase of seed and is recoverable from the produce of the harvest for which it is given. The security in such cases is ordinarily the joint personal security of a number of cultivators of the same village grouped together for the purpose. The second purpose for which *taccavi* is given is to effect a permanent improvement in agricultural conditions by providing money for the extension of irrigation facilities. Such loans are usually given under Act XIX of 1883, though, in the case of machinery, Act XII is applicable. These loans are repayable by instalments spread over a number of years and are usually secured on landed property. The demand for loans for permanent improvement of agricultural facilities is comparatively limited, and requests made to Government for loans for this purpose are generally met, provided the security is satisfactory. The demand for loans for seed and bullocks is very different. Its extent is almost unlimited in the present conditions of agriculture. The cultivator borrows extensively for his ordinary agricultural operations, because he either has not sufficient surplus to build up a reserve, or if he has he is too ignorant and thriftless to use it for that purpose; so he has recourse to the moneylender, who, owing to the

high rate of interest charged, can afford to take risks in the matter of security and finds it profitable to keep debts running indefinitely. Once in debt the farmer finds it difficult to free himself. The elasticity of the moneylender's methods attracts the cultivator and makes the need for borrowing chronic even in favourable seasons. Till conditions change fundamentally and existing debts are cleared, the amount of money required as loans in each season to finance agricultural operations must be far beyond the sum which Government can provide. Even if Government could provide the money on easy terms of interest, it is doubtful whether they could oust the moneylender, except by making his profession definitely illegal. Any Government system of loans must be as rigid as the moneylender's is elastic. As soon as the rigidity of the Government system is relaxed, abuses creep in, and the cultivator suffers. If the impression gets abroad that distribution is not carefully watched, much of the money provided by Government goes astray. If it is found that prompt payment is not enforced, the cultivator is too ready to offer the collecting staff inducements to delay the day of settlement. Fresh loans are sought not for legitimate agricultural purposes, but in order to repay the existing loans. Even with the limited lending which Government now undertake, they find it difficult to exercise adequate supervision over the operations and the elaborate accounts which are necessary. They are now, therefore, revising the existing rules to ensure easier and stricter control, simplify the system of accounts, and prevent abuse and waste. If Government were to extend their lending operations further, petty officials would be multiplied and control will become impossible, unless the system were made even more rigid and the supervising and inspecting staff proportionately increased. The more rigid the Government system became, the more unpopular it would grow. There is, therefore, little scope for development of Government operations in this direction.

Government must, therefore, continue their present policy of using the indirect means which they can employ of reducing agricultural indebtedness, improving and developing their machinery as opportunities offer. They can by themselves providing and encouraging private persons to provide protection against drought make less frequent the recurrence of conditions which compel the cultivator to borrow. This policy Government have steadily pursued in the past. The canal system of the Province has been continuously developed, and the Sarda canal which will be completed within two years marks another long step forward. By giving loans under Act XIX, well construction is encouraged; the number of, masonry wells in the Province has increased from 302,000 to 441,000 in the last thirty years. The power of resistance of the tenantry has developed rapidly in recent years: and widespread famine is now unlikely to recur. Government can also reduce the need of the agriculturist to borrow by shaping their land revenue policy in such a way as to leave with him as much as possible of the surplus which he earns. An increasingly liberal system of land settlement is one of the outstanding features of the administration, though it is one that is not always recognised. New settlement rules on much more liberal lines are about to come into force and mark another advance in this direction. Under them, the land revenue will be as low as about 2 per cent. of the value of the annual produce. Government can also try to reduce the opportunities of the moneylender to make exorbitant profits from the agriculturalist by such measures as the Usurious Loans Act. Such an Act is, however, difficult to make effective. The recent amendment has extended its scope, but even so it is doubtful whether it will bring about any substantial decrease in the rate of interest generally taken. Few agricultural loan transactions ever go before the courts, because it is not to the interest of the moneylender to terminate the loan. Many loans are given without any but personal security, and the courts find it difficult in such cases to avoid considering a high rate of interest as reasonable. It is also impossible to devise an Act of the kind

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which will not be open to evasion. If such an Act could be made really effective its result would be to reduce the credit of the cultivator, but only up to the limits beyond which credit should not by economic laws be given; and the discovery that the cultivator can no longer raise money with the same facility as before would probably do more than anything else to induce him to keep his surplus profits towards building up a reserve. A Land Alienation Act is another direction in which Government might be able to protect the cultivator. But the problem is difficult, and opinion differs considerably on the desirability of such a measure in the United Provinces. The whole question was examined carefully in 1909, and the most experienced revenue officers then held that such an Act was not desirable. It was shown that conditions in the United Provinces differed fundamentally from those in the Punjab, that it was difficult in many cases to distinguish the agricultural from the professional castes and that by limiting the class of persons who might buy landed property the amount of land sold might well be increased rather than decreased without preventing the moneylender from acquiring it. Government are again examining the question and collecting figures from all the districts with a view to ascertaining whether the tendency of the last fifteen years shows that the former decision should be reconsidered. Other measures, such as the development of co-operative societies, do not concern the Revenue Department, and are therefore beyond the scope of this note. The general question of the surplus which the average cultivating family can save in different parts of these Provinces and the possibility of increasing it is fully dealt with in Chapter XXVI of the Government report,* which has already been submitted to the Commission, and need not be further discussed here.

QUESTION 7.—FRAGMENTATION OF HOLDINGS.—The chief obstacle in the way of consolidation of holdings lies in the opposition of the villagers. The farmer has not only a sentimental attachment to the land which he and his forefathers have cultivated, but also practical reasons why he does not want his holding in one compact block. Land in nearly every village varies almost from field to field through almost imperceptible gradations of fertility; but, broadly speaking, it falls into three main divisions—superior, ordinary and inferior—according to position and the natural quality of the soil. Position may be good or bad according as it is either near or far from the homestead or a canal outlet. Other things being equal, the nearer land is to the homestead the more lavish is the expenditure of manure and labour upon it. But if irrigation is entirely from a canal and owing to its alignment the fullest and most regular supply of water reaches the outlying parts first, manure will follow water and the outlying area will be the best. The land in each of the three main divisions is suitable for crops of different types. Where the water supply is full and the land heavily manured the rotation will probably be sugarcane, wheat, and in the third year a double crop. In the area of intermediate quality, barley and *juar* will be most commonly grown, while the inferior tract will produce the poorer kind of crops, including some fodder crops. The cultivator requires every year crops of all these different types for his ordinary operations. He does not want to pay high rent for superior land to grow crops which inferior land can equally well produce. The landlord would also be faced with serious difficulties if all holdings were completely consolidated. He would have no difficulty in disposing of the holdings which consisted entirely of superior land, but he could hardly find tenants to take holdings composed entirely of inferior fields. Such holdings would have to be large in order to produce sufficient to give the cultivator a living. The superior holdings would then have to be reduced to an uneconomic size. Further, the inferior holdings would, in most cases, be almost entirely unirrigated and in years of drought the

* Report on Agriculture in the United Provinces. (Not printed.)

cultivator would have no crops at all in any of his fields and the effects of famine would be much more severe.

Complete consolidation of holdings is suitable to villages in which the whole of the area is homogenous both in quality and in irrigation facilities. Such conditions are rarely found in these Provinces. A further obstacle is the existence of partitions which in a high percentage of cases are by fields and not by compact blocks. In such villages, if consolidation is to be complete, landlords must be compelled to take tenants whom they may not wish to have. In the United Provinces, therefore, complete consolidation is neither possible nor desirable. Any attempt at compulsory consolidation would be deeply resented and by prejudicing the movement at the outset would probably do more than anything else to prevent its ultimate success. But some measure of consolidation would certainly be beneficial. It should be possible within the main divisions of soil to persuade the villagers to exchange individual fields so as to give each of them compacter areas. The new Agra Tenancy Act which has just come into force provides greater facilities for voluntary exchange of land. But the example of the Punjab shows that much propaganda and patience are necessary before even this limited measure can succeed. Even when consolidation has been effected, the Hindu law of succession must make it difficult to maintain, and any measure to alter the fundamental principles of the Hindu law in this respect hardly comes within the realm of practicable legislation.

Oral Evidence.

35,452. *The Chairman*: Mr. Lane, you are Revenue and Judicial Secretary to the Government of the United Provinces?—Yes.

35,453. We have your note of the evidence which you wish to put before us; would you like to make any statement in amplification of that at this stage?—No.

35,454. I should like to ask you questions on one or two general points before I turn to the substance of your note. I take it that you have had long experience in the districts in this Province?—Yes, about fifteen years in the districts.

34,455. What do you think is the general attitude of mind of members of your service towards economic development in rural areas? Is there a feeling that the Revenue Service is responsible at all for that?—Only indirectly, I think; it is not essentially their work; they are concerned with every department, but not as experts; the tendency nowadays is more and more for each department to develop separately.

35,456. Do you think the growth and extension of the Agricultural Department and the Agricultural Service has rather altered the views of your own service in respect of that particular responsibility?—I should say it has, certainly; the Collector previously was much more directly responsible than he is now. My experience is much more of settlement work than as a District Officer; I was nine years a Settlement Officer before I came into the Secretariat, and I have not really much experience of ordinary district work; but, speaking generally, I should say that was the tendency.

35,457. The improvement of the economic position of the countryside and of agriculture in particular is a very difficult undertaking and requires all the advocacy and all the zeal and capacity that can be mustered?—I should say the position is this: previously, the Collector had a more adequate administrative staff in all the larger districts in the Province when I first came out, for instance, in Meerut or any of the larger places. The Collector probably had one

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if not two Joint Magistrates and an assistant; he now is there by himself; he has practically no assistance. The cadre of the I.C.S. is considerably reduced. The work is much more difficult in other ways, and it is very difficult for him to find the time that he would like to give to these things.

35,458. I was only concerned to get from you information as to whether it would be possible for them, in the circumstances in which they now find themselves, to interest themselves a little more in rural economics than in fact they do?—I think they are extremely interested; I do not think they can be more interested. The Collectors give all the time they can for these things; I think it is a question of time.

35,459. I understand from your note that from your experience you hold that the granting of *taccavi* loans is probably conducted on as liberal a scale as is compatible with public interest?—As is compatible with the machinery which the Revenue Department has.

35,460. You mean the kind of machinery or the extent of the machinery; is that the limiting factor?—The limiting factor is, I think, the staff available. The Revenue Department has not sufficient machinery.

35,461. Could you suggest any simplification of the practice?—Of giving loans?

35,462. Of examining applications. I suppose that is where the delay occurs, is it not?—The only thing which is necessary when an application comes in is to see whether the security is adequate; that is the principal thing. I am not aware that there is any very big delay.

35,463. In your experience what time elapses between an application from the cultivator and the granting of the loan; can you give us any indication?—I can only give my own experience of distributing *taccavi*, and then there is no delay at all. If the money is granted, say in October, it is straight away distributed.

35,464. Perhaps the principal criticism from the cultivator's angle is, as you suggest, the inevitable rigidity of the administration of the loans made from public funds, as compared with the moneylender's methods?—What happens is, when the staff goes out to collect, the cultivator is willing to pay Rs.5 or 10 to be allowed to postpone repayment for the next instalment, and he hopes eventually that the whole can be remitted.

35,465. The moneylender, of course, is perfectly ready to remit payments of interest provided the interest accumulates and his hold on the cultivator is thereby strengthened?—That is what he likes.

35,466. The new settlement rules will apply in the coming settlement?—Yes.

35,467. There is, I think, a Panchayat Act in this Province, is there not?—Yes.

35,468. How long has that been in force?—For about four or five years.

35,469. Have you any views as to its usefulness?—I have no experience of it at all.

35,470. Are there any signs of activity amongst the panchayats in villages in districts which you know intimately?—I understand (I am speaking simply from paper knowledge) that it depends entirely on how far the local authorities are interested in the thing, and it is entirely a personal matter. The extent to which the panchayat does or does not succeed very largely depends on the extent to which interest is taken and on the amount of supervision by the district authorities. It also depends greatly on the men available for the panchayat. There are certain areas in which they can succeed, and there are some in which they cannot succeed; that depends on the composition of the village community.

35,471. Do you come across caste panchayats at all in this Province?—For ordinary social purposes, yes, certainly.

35,472. But the caste panchayat does not operate outside the social sphere, does it?—Not directly, certainly. It imposes penalties for breach of caste rules and the like.

35,473. Did you ever come across a village in which the village panchayat was doing good work?—I have no experience; that is not my line at all.

35,474. Have you any experience of the co-operative movement?—No.

35,475. To return for a moment to this question of *taccavi* loans, do you conceive that it is within the realms of practical politics to extend the amount of capital available in the shape of *taccavi* loans to a point where it could approach the total requirements of the cultivator? The total amounts lent under both the Acts, the Land Improvement Act and the Agriculturists Loans Act, are really very small in relation to the aggregate requirements of the cultivator, are they not?—It is a question of increase of the Famine Insurance Fund as I understand.

35,476. I am really concerned to ask you whether you contemplate the extension, to that extent, of *taccavi* loans?—I do not think it is possible. Unless the existing machinery is enlarged to an extent entirely out of proportion to what it is, I think it is out of the question altogether to finance the whole of the agricultural operations.

35,477. So that, unless you are prepared to leave the provision of capital to the ordinary moneylender, it will appear that the co-operative credit societies offer the only alternative to the moneylender?—Yes, I think so. If you try to do it by Government agency you will have to have a separate department altogether; the Revenue Department could not possibly undertake it. Even now it is a heavy burden on the ordinary *tahsil* staff if you get scarcity or famine; there is all the accounting and that side of it.

35,478. Do you think that at the moment in the Province there is any competition between the Government through the *taccavi* Acts and the co-operative movement through its credit societies?—You mean by competition one is trying to oust the other?

35,479. Yes?—I should not think so. I think *taccavi* is regarded by Government as a means of meeting emergencies largely.

35,480. Rather than for improvements?—The *taccavi* does not go beyond the fringe of the question for ordinary works of improvement.

35,481. On the question of fragmentation, are you familiar with such experiments as may exist?—No.

35,482. *The Raja of Parlakimedi*: What is the usual period fixed for the recovery of *taccavi* loans in this Province?—Under which Act?

35,483. For irrigation?—Ten years; 20 half-yearly instalments.

35,484. Under the Land Improvement Act?—Yes.

35,485. Are not people allowed to borrow money to improve their fields otherwise?—Yes, for reclamation.

35,486. What is the period allowed for that?—The same period; it is the same Act, the Act of 1884.

35,487. Is there any limit fixed beyond which a person cannot borrow?—There is no limit under Act XIX of 1883. The rule is that if the period is more than twenty years the sanction of the Government is necessary.

35,488. The whole amount can be made available to a single person?—There is nothing in the rules or the law that prevents or limits, as far as I am aware, the size of the loan which can be given to any one individual.

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35,489. Do you not think that it is desirable to do so, so that the money may be properly distributed?—I do not think that the question will ever arise, because Government sees that it is properly distributed.

35,490. We have observed in one case in Nagpur where a person has acquired a large area of property by *taccavi* loans, because of his influence or some such thing?—I do not think that you will find a case like that in this Province. I am certainly not aware of any such case. What happens in practice is that as soon as the budget is through, the amount sanctioned is allotted to the different Commissioners and they allot it to their various districts. The amount which is asked for in the budget is based on the report which previously comes from the Commissioners and, as soon as the budget is through in April, the amount is distributed and each Commissioner gets an allotment which he distributes to his districts. Of course, if a Commissioner comes up for an enormous sum of money for one project he is simply refused, because the money is not there to be given to him. But generally the Commissioner gets what he asks for.

35,491. The wells mentioned on page 204 of your note, I take it, have been increasing entirely for irrigation. You mention that these wells have increased from three to four lakhs. Is it because of the facilities for borrowing money for constructing them? Or do I understand that as it pays the people better to carry on irrigation from wells they have been constructing from private funds?—One reason is that in the western part of the Province the cultivator has more money to spend on that. I do not know what the percentage is of wells which are built by private funds but I should think the *taccavi* loans are only a small percentage of the total number of wells.

35,492. What are the rates of revenue adopted under these privately-owned wells? The cultivator has to pay upon his holding so much revenue to Government under this well irrigation. I want to know how much extra he would have to pay?—Nothing extra as revenue.

35,493. Is it because he maintains it entirely himself?—No. What happens is this: the Settlement Officer calculates the gross assets and from that he deducts an allowance equal to the extent to which the assets have been increased by the construction or improvement of the well. If the land was previously dry and is made wet by the construction of a well it will be assessed to revenue at dry rates for the period of the next settlement.

35,494. Is that the case in the talukdari areas also?—Yes, it is just the same. The Land Revenue Act applies to both Agra and Oudh. The law and the principles of settlement are roughly the same in both the Provinces.

35,495. At what intervals is the settlement carried out in these Provinces?—Up to now it has been thirty years; in future it will be forty years.

35,496. Is there a proposal to that effect?—It has been sanctioned by the Government of India for these Provinces.

35,497. The period of settlement is not twenty or thirty years?—There are no twenty years' settlements in these Provinces so far as I am aware. There are five years' settlements in alluvial *mahals* and certain precarious tracts.

35,498. In the Madras Presidency, in zamindari areas, the Act lays down that after twenty years if there is an appreciable amount of increase in the food prices the zamindar can apply for an enhancement of two annas in the rupee?—That is not settlement. I am talking about the revenue which Government takes from the zamindar.

35,499. He can apply for re-settlement also?—The system here is quite different from that which obtains in Madras. I understand the assessment you are talking about is the assessment of rent on the tenant. What we understand here by settlement is the settlement of revenue on the landlord.

The present position in the Province of Agra is that the landlord can get an enhancement of rent after twenty years and his revenue is fixed for forty years.

35,500. Is there nothing here like the Land Acts which we have in Madras which clearly state the conditions between the ryot and the zamindar and also what sort of security is required?—Yes, there is the Oudh Rent Act and the Agra Tenancy Act. There are separate Tenancy Acts for both the Provinces. We have had a new Tenancy Act passed for Agra as recently as 1926.

35,501. Do I understand that the ryot here has got sufficient security on the land so that he can increase the fertility of it and carry on improvements?—With very few exceptions that is the case.

35,502. We call them occupancy rights?—There are two main classes of tenant in the United Provinces: one is called the occupancy right and the other which has just been created in Agra is called the statutory tenant.

35,503. There are different areas where the ryot cannot acquire occupancy rights in zamindari or what we call home-farm land?—There has been no acquisition of occupancy rights in *sir* up to now. Under the Agra Tenancy Act of 1926 the landlord can confer occupancy rights in *sir* but there is now acquisition of occupancy rights by prescription, i.e., by holding land for a certain number of years. That has just been altered by the new Act of 1926. If the landlord wishes he can confer occupancy rights in his own farm.

35,504. Can the landlord buy land and hold both the rights himself in these areas?—You cannot have zamindari rights and tenancy rights subsisting at the same time and in the same land and held by the same person.

35,505. So the zamindar cannot buy any area where occupancy has to be given to ryots and then lease it out to a private ryot for cultivation. In Madras especially there are areas in zamindari in which, if a zamindar purchases land and leases it, the cultivator who enters upon the land and cultivates it cannot be ousted?—The tenant cannot; in the United Provinces he cannot be ousted now.

35,506. But there are lands also in Madras where the zamindar has got both kinds of land?—If the landlord's demesne is *sir* land in that case statutory rights do not accrue, so that there is no question of tenancy rights. The zamindar cannot have zamindari rights and tenancy rights in the same land. But if it is the landlord's, *sir* then tenancy rights do not accrue. The only right which the ordinary tenant has in *sir* lands is the right to hold them from year to year.

35,507. But supposing the landlord cultivates the land himself?—The present new law in Agra is that if he cultivates it for ten years with his own cattle it becomes *sir* land, and he can then let it to a tenant who would not acquire statutory rights.

35,508. It is not possible in Madras?—This is a new provision introduced in the Agra Tenancy Act.

35,509. *Sir James MacKenna*: The settlements are to be for forty years in the future?—Yes.

35,510. Have you any provision in your settlement arrangements for the revision of a particular tract during the period of settlement on account of violent changes in the conditions of the land; for instance, by the breaching of a bund a tract might be considerably reduced in value or by the construction of a protective work of irrigation the tract might be very considerably improved?—If the land deteriorates, yes; if the land improves, no. There is a provision in the Act enabling Government to appoint a Settlement Officer for this purpose.

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35,511. It would be interesting to have a simple statement of the general land revenue system. You have been a Settlement Officer for many years and now you are the Revenue Secretary here. A start would be made with the 16-in. cadastral map which is usually provided by the Survey of India, or which was provided many many years ago, I should say?—It is always made by the *patwaris*; we have it done locally.

35,512. Starting off with that, what is the revenue system briefly?—The settlement starts off with the existing records which are revised annually. They are all based on this map.

35,513. Are they brought up to date annually?—Yes.

35,514. And are accretions assessed annually?—Not generally except in the alluvial *mahals*, which are under five years' settlements. The first thing which happens in the ordinary settlement is that when the records are revised, the map is thoroughly overhauled. Every individual who is interested in the land receives an attestation slip in which his rights are shown and if he has any objection he makes that objection in the Assistant Record Officer's Court. Those are all decided and the record is brought completely up to date. That is the records' part of the operation. When the Settlement Officer comes to the district the first thing he does is to inspect the villages and do soil classification, dividing up the whole of the land so that every field is placed in one or other of the soil classes. The different *chaks*, as they are called, are shown in the *patwari's* map. There is thus a map showing how the Settlement Officer has classified the soil, first class, second class, and so on. The maps go into the Settlement Office, and on the basis of them the rentals are all analysed. What you then find, practically in the whole of the Agra Province, is that, according to the length of time during which a tenant has held a field, the rates of rents vary. In the western districts, for example, you will find that the old occupancy tenants, who have held the land for over thirty years, probably pay a rate which is about half the rates which tenants-at-will are paying now. You get a series of levels of rents for old occupancy tenants, the newer occupancy tenants, and the tenants who have held the land for periods between twelve and twenty years, beginning, say, from Rs.5 and going on to Rs.7, Rs.8, Rs.9 and Rs.10 an acre. There are two problems: at the one end, you have got controlled rents, that is occupancy rents which are extremely low, generally speaking, and at the other end you have competition rents which are pretty high. It is the duty of the Settlement Officer, in the fixing of rates, to see that he does not fix rates which will give an excessive enhancement of rents during the period of settlement. He fixes a standard rate for the occupancy land. The usual consideration by which he is bound in those cases is to avoid rates which will give too heavy an enhancement of rent on the occupancy land. Those rates are used for the valuation of occupancy land, and, subject to an allowance on account of proprietary cultivation, they are also used for the valuation of the land cultivated by the proprietor, and other land for which there are no cash rents. They are called assumption areas. For these, there are no cash rents, and it is necessary to find some standard by which to value the land which is not rented. The standard rates which are considered to be suitable for valuing the occupancy land are applied to the assumption areas after 25 per cent. deduction has been allowed in the case of proprietary cultivation. In that way, you get a standard for valuing your occupancy land and your proprietary cultivation. At the other end of the scale, you have got non-occupancy rents, and you will find from the statistics that the competition rents in Agra are generally so high that they are not ordinarily paid from year to year, and the problem in valuing non-occupancy land is to make the necessary allowance for short collections and the fact that the zamindar does not realise his rent in full from year to year. In the recent settlement this allowance

has been very liberal; generally speaking, it has been somewhere in the region of 20 per cent. of the recorded rent. Having made this allowance for instability, you have got your valuation of the whole of the land; that is known as the gross assets. From that is deducted the 25 per cent. allowance on account of proprietary cultivation which I have mentioned, and also any allowance which is necessary on account of improvements such as new wells, etc.

35,515. Allowances are made for improvements?—Yes. If a certain area has been converted from dry to wet, in the soil classification it is shown as wet, because it is wet; but from the gross assets you deduct an allowance equal to the difference in the valuation of the land at wet and at dry rates. In fact, you are assessing that land at dry rates, and that gives you the net assets. To these assets you apply the ordinary percentage at which revenue is taken.

35,516. What is the percentage?—Up to now, it has been, according to the rules, 50 per cent., but in all recent settlements it has been between 43 and 45 per cent., and by the new settlement rules it is 40 per cent.

35,517. When a Settlement Officer has completed his maps and records, what happens?—They are handed over to the *patwari*; the *patwari* is the man who is responsible for actually keeping them.

35,518. He has to keep them up to date?—He is supposed to keep all the maps up to date, but the maps are probably not kept up as well as the other records.

35,519. On a revision of settlement, you have a revision of survey?—Yes, but in order to reduce the cost only those fields are measured of which the boundaries have changed since the previous settlement. If two fields have been amalgamated, or one field is split up, there is a remeasurement, but not of the other fields.

35,520. In Burma, we have a pure ryotwari system?—The basis of the whole of the settlement here is rents. You have got your rents, and they give you facts; you use them as your guide as to what the value of the land is.

35,521. Who is above the *patwari*?—There is the supervising *Kanungo* above the *patwari* as inspector. By the rules, he is bound to check a certain percentage of the total number of fields with the map; he goes round and every entry which he checks he initials. He submits his reports to the Deputy Director of Land Records. Above him you have the tahsil staff, the Naib Tahsildar and the Tahsildar, who are also responsible for checking the records; there is also the Deputy Collector in charge of the sub-division, and he is expected to do checking work. In addition to that, you have also the Land Records Department.

35,522. What does the Land Records Department do?—They also check and give advice on the points which arise.

35,523. What is the strength of the department?—At present it is small. There are three Deputy Collectors and three Tahsildars, but Government have before them proposals to increase it considerably.

35,524. Are the *patwaris* and *Kanungos* attached to the Land Records Department?—There are only six of these special land records officers, and where they are attached to a district the *patwari* and the land records staff are under them. The special land records officer has the power of punishment, and in districts where he is permanent, he ousts the Sub-divisional Officer from the control over the land records staff, but he does not relieve the Sub-divisional Officer of the duty of checking the records.

35,525. The connection of the Sub-divisional Officer and the Tahsildar with the survey and settlement staff is very close?—Not during settlement.

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- 35,526. After settlement?—They are responsible for part of the work.
- 35,527. There is not a considerable land records staff?—The special land records staff has up to now been experimental. Defects have come to light, and there is now a proposal before Government to have more special land records officers.
- 35,528. The ordinary District Officer is in very close touch with the cultivator?—Yes. Of course, now, he is getting less and less into touch with the cultivator, because the touring period has been cut down, in deference to the wishes of the Council. It is becoming more and more difficult for the Collector to keep touch with the people. His touring is cut down, the Tahsildars' touring is cut down, as also that of the Sub-divisional Officers; it is cut down right through. The tendency is not to allow the Collector to go into camp.
- 35,529. *The Raja of Parlakimedi*: Who conducts the *jamabandi*?—*Jamabandi* is one of the records which shows the rents and payments of rent.
- 35,530. It is done by a Sub-Collector in our parts?—The *jamabandi* gives a record of the rents collected by the landlord from the tenant, not the revenue collected by Government.
- 35,531. For the zamindari area in Madras it is called the quit rent. But the *jamabandi* officer has to report about the health of the people and the general conditions?—It is one of the duties of the *patwari* to make reports of epidemic diseases, and in his diary he records any event which is of interest. He has to report at once any outbreak of disease, or any calamity, or any of the more important things which happen in his circle; he has to report to the Tahsildar.
- 35,532. Is there a sort of annual inspection by the Sub-divisional Officer, an annual checking as to what work is going on in those particular areas?—The superior staff, the Naib Tahsildar, the Tahsildar and the Sub-divisional Officer have to see that the supervising *Kanungo* is checking properly. The duty of the officers above the supervising *Kanungo* is to see that his checking is effective; their attention is focused on the re-checking of fields which have been already checked by the supervising *Kanungo*, to see that he is not merely making a nominal check.
- 35,533. *Sir James MacKenna*: Before these restrictions on touring were introduced, what was the method? To go out for a period of three to four months at a time?—Yes, that was the usual thing.
- 35,534. Moving with tents?—Yes.
- 35,535. And the villagers used to go round to the Sub-divisional Officer's camp and the Collector's camp and talk freely with them?—The Collector and the Sub-divisional Officer were always moving about.
- 35,536. Meeting the villagers?—Yes; riding about and seeing the villagers.
- 35,537. The conversation was mainly concerned with cattle and agriculture?—About local conditions, local politics, their fights and factions, in fact, everything connected with village life.
- 35,538. About their general economic development?—Yes; they were getting intimate knowledge of the district.
- 35,539. With these restrictions upon touring, of course the touch of the District Officer with the villagers is becoming less?—It is difficult for the Collectors to keep in touch with them.
- 35,540. I think at one time there was a scheme by which young Assistant Commissioners were sent to Cawnpore to have agricultural training. Has that been abolished?—Instead of that, there is now a class for junior Civilians, Deputy Collectors, Tahsildars, and some Honorary Magistrates; there is a proposal to bring in Munsifs also. It is a general training class for all young officers.

35,541. Do they teach agriculture there?—They are taught the elements of soil classification, but not, I think, the technical side of agriculture.

35,542. *Sir Henry Lawrence*: Is there a farm there?—I could not say whether there is a farm at Moradabad or not. I think there is sure to be a Government farm there, but I cannot say definitely.

35,543. *Professor Gangulee*: On what data do you base your soil classification? Is there any particular principle that you follow?—The soil classification, so-called, would be more correctly defined as a classification of land values. It is not really a soil classification. What you try to do is to group together all land which has roughly the same letting value. The same soil, if it is near a village, will be in one soil class and if it is far away will be another soil class. It is a question of co-ordinating land values.

35,544. *The Raja of Parlakimedi*: That means also the productive capacity, I suppose?—Yes.

35,545. *Professor Gangulee*: You tell us that you have extended the period of assessment to forty years. What are the chief reasons for this extension?—I do not think I can hazard an opinion on this point. The reasons are partly fiscal and partly political.

35,546. Moving towards permanent settlement?—No, certainly not.

35,547. What is the proportion of net assets that is taken as revenue?—40 per cent. is the ordinary level taken.

35,548. How do you determine the net assets?—It is a complicated process. You determine a standard of valuation for different kinds of tenure, occupancy tenants and non-occupancy tenants, and proprietors' cultivation. That gives you your net assets. The standard of valuation is based on the levels which you find existing of the actual rents, and that gives you your gross assets. From that you make a deduction for proprietors' cultivation and improvements, and after deducting that you get your net assets. The problem at present, of course, is to find a valuation which is fair without being either inadequate or excessive.

35,549. How do you arrive at that standard?—It is all done on the basis of existing rates. You find in this Province that as the tenure becomes older the rent becomes lighter. You divide up your land here in this way. You find the rates of your old occupancy dating back to the previous settlement, of between twenty and thirty years, and of from twelve to twenty years, and of the non-occupancy up to twelve years, and you generally find the incidence of rent running in a regular series in nearly every district. If Rs.10 is the competition rent, it is clear the landlord can fairly ask for a higher rent than Rs.5, and the question is what enhancement he is entitled to. The standard you take for the value of all except non-occupancy land is the standard the Settlement Officer considers just in view of that series of incidences. The level usually taken is the general level of occupancy rents between twenty and thirty years old and the result is an enhancement of about 30 per cent. on old occupancy.

35,550. Has there been any attempt to define in various tracts the economic units of cultivation?—I do not understand what you mean by that.

35,551. It is a unit which a cultivator would require for producing sufficient to support him and his family?—You mean the area of land necessary for him? There is nothing I know of about that, except in the last chapter of the provincial Memorandum.*

35,552. It struck me that it was not quite clear what were the economic cultivating units in different tracts in this Province?—I do not suppose it is.

35,553. In your Muttra Settlement Report you make a very interesting observation on the effect of density of population on rent. Could you

* Chapter XXVI in the Report on Agriculture in the United Provinces. (Not printed.)

explain a little further what the actual situation is? Do you find the same situation in other districts?—Certainly. That is brought out in the last chapter of this memorandum. We show there that although the actual outturn of land is probably acre per acre the same in Meerut as in Gorakhpur, the rents in Meerut are twice as great. That, however, is another point and rather depends more on the size of the holding. I have never seen the density of population principle illustrated to the same extent as in Muttra. It is a clear case. I know the whole district intimately. We had the basis of all the crop-cutting experiments to go on. As far as one can see there is no appreciable difference between conditions east and west of the Jumna, yet competition rents on one side are double those on the other.

35,554. *Sir Henry Lawrence*: Was that due to pressure of population?—Almost entirely. On one side of the river there is competition for tenants and on the other competition for land.

35,555. *Professor Gangulee*: Do your subordinate revenue officials have some training in agriculture or rural economics? Would that help them in discharging their duties?—What type of official are you thinking of?

35,556. Revenue Inspectors, Tahsildars, and so on?—I should not think it would be the slightest use to a Tahsildar to have a training in agriculture. He would merely get a smattering of it, and he would probably get it wrong.

35,557. What is his education now?—It varies. Some are graduates.

35,558. Would you prefer an agricultural graduate to an ordinary Arts graduate?—As a Tahsildar?

35,559. Yes. Do you not think that a Tahsildar would profit by some training in rural economics, because he has to deal with conditions of rural life?—I very much doubt that he would be able to apply his knowledge. It might help.

35,560. Turning to the question of *taccavi*, is the demand for *taccavi* more for permanent land improvement than for temporary facilities, such as seeds, manures, etc.?—It depends entirely on the season. I have given figures for the last thirty years. If there is a famine or scarcity naturally enough the demand for seed goes up to almost any height and the demand for making wells does not increase to the same extent.

35,561. Is it more for seeds, manures and bullocks and less for permanent improvement, taking normal seasons?—The figures are here. It has been considerably more for seeds and bullocks.

35,562. Now, with regard to the Usurious Loans Act, has that been effective in these Provinces?—I should say hardly at all. I do not think there is one case in a thousand that it ever touches. One reason why it has been of little use is that until the amending Act this year it did not touch mortgages. I do not think the amendment will do very much. But it does at least cover mortgages now.

35,563. Is it not applied at the present time?—The *bania*, naturally enough, rarely puts his tenant into court. He does not want to realise his whole debt. There is also the difficulty that you do not know what attitude the court will take about a reasonable rate of interest. In the case of a loan given on no security at all the court may consider 25 to 30 per cent. as a reasonable rate of interest.

35,564. *Sir James* referred to the facilities given to Collectors in the old days. Was it the practice in those days to send in reports to the Commissioner?—The Collector sends in a report about a particular matter on which he is supposed to report to the Commissioner. The Assistant Collector has in the first four years of his service to submit a diary to the Collector, but the Collector does not submit any general diary.

35,565. When they used to send in reports, did these reports contain useful information about rural economics?—If any problem arose which required any action to be taken on it, the Collector would of course report to the Commissioner, but he would not sit down and write an economic history of his district, or anything of that sort.

35,566. Your point is that Collectors were more in touch with the rural population in those days?—They were moving about the district much more. Nowadays the Collector is more tied to his headquarters than he was. There are now a hundred and one things he has to go into headquarters for. His cold-weather tour is very much more broken up than it used to be.

35,567. *Mr. Calvert*: Is the Agriculturists Loans Act regarded here as an emergency measure?—To a great extent. The policy of Government is to use it largely as an emergency measure. I think the figures show that pretty clearly.

35,568. Can you explain how that idea arose?—Owing to lack of sufficient funds and lack of machinery in the *tahsil* it is quite impossible for Government to undertake the financing of the agriculture of a Province.

35,569. Of course the original Act was not confined to emergencies. The purchase of seed and cattle was an alternative?—Yes.

35,570. And the original Act was of course the result of the Famine Commission, which recommended such alterations in the old Act as would make the *taccavi* system more popular and elastic?—Yes.

35,571. Do you regard the rigidity of it as practically irremovable?—If you remove the rigidity, you at once open the door to a flood of abuses. That is my experience in *taccavi* matters. As soon as you relax control over collection and distribution and the management of *taccavi* generally, you encourage dishonesty and exactions by the petty officials. For instance, you get the *patwari* taking advances in the name of his pony and parrot, which I believe occurred once, and you get confused accounts and you find that a great deal of money which is distributed does not get to the cultivator and a good deal of what is paid does not find its way to the Government. As soon as the impression gets abroad that, if the tenant only delays matters he gets remission of his *taccavi*, you get abuses. That is the crux of the matter.

35,572. Does this Province lose much by having to remit loans under this Act?—The remissions have been pretty heavy. For instance, in the Muttra district, I think I am right in saying that something like three lakhs of rupees were remitted when I was Settlement Officer there.

35,573. The *taccavi* Acts were passed as an alternative to a proposed agricultural land bank?—Yes.

35,574. You admit in your note that the cultivator must borrow?—Yes.

35,575. In the original Act, you remember provision was made to allow Government to advance sums to cultivators through agricultural land banks?—Yes.

35,576. Would you advocate a return to that, allowing Government to advance money through agricultural land banks?—They would be co-operative credit societies?

35,577. Of course, in those days co-operative societies had hardly been heard of?—Yes.

35,578. You also say that the number of suits brought by moneylenders against agriculturists is not very great?—I should say so; I have no figures to go on.

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35,579. You do not publish separate figures showing suits against agriculturists?—No; as a matter of fact, I tried to get figures when I was writing this resumé of the Act; the Judicial Department could give me no figures at all.

35,580. I could not get them either?—No, I do not think they are there; the Judicial Department said the only way to get them was to write to every District Judge, and then he would give you no information which was worth having.

35,581. You are rather pessimistic as to the desirability of complete consolidation?—Yes.

35,582. Have you yourself ever carried through complete consolidation in a village?—No, I have no experience of it at all.

35,583. Have you ever seen a consolidated village?—No, I do not think there are more than half-a-dozen in the whole Province.

Mr. Kamat: What is the *nazarana* system in the Lucknow Division?

35,584. *Professor Gangulee:* Is there any system?—I should not say there was any system.

35,585. *Mr. Kamat:* There is some practice of taking *nazarana* over and above the rent?—Yes, it is a fairly prevalent custom, I should say; of course, there are no statistics available on the subject, but it is more or less common knowledge that *nazarana* is taken fairly extensively.

35,586. What percentage does it form of the rent?—Until the Oudh Rent Act was amended it has been estimated by Settlement Officers that it was about 25 per cent. of the rent, but it is nothing like that now. Under the old Oudh Rent Act the tenant only held for seven years, and then he was liable to an enhancement of one anna in the rupee. What happened was that prices of grain went up enormously, and a rise of one anna in the rupee had no relation whatever to the rise in the economic value of land; the result was that the one anna in the rupee was recorded in the papers and the balance was taken in the form of a premium. It is a very natural system; I believe it is quite common in England. For instance, if you have a house to let and there is a great demand, you take a premium and then fix the rent. It is exactly the same system here; it has now been practically recognised in the Agra Tenancy Act, under which you can now sell off occupancy rights.

35,587. Do the Government take any share in the *nazarana*?—No, not directly; in most of the Oudh settlements what generally happened was that in regard to Agra non-occupancy land, that is to say, lands in respect of which the rents were not controlled, an allowance was made for instability; that is to say, if the genuine recorded rent was Rs. 10 an acre, it was valued for the purpose of assessing revenue at Rs. 8 an acre, allowing 20 per cent. for instability. In Oudh what was done was that the instability was set off against the *nazarana*, and the valuation that was taken was the recorded rent. As a matter of fact, even so, the recorded rent was probably a great deal less than what was actually collected. So that I think, generally speaking, you may say that Government in the past has taken nothing of the *nazarana*.

35,588. You say in your note that an increasingly liberal system of land settlement is one of the outstanding features of the administration?—Yes.

35,589. Will you kindly explain in detail how the land settlement has of recent years become increasingly liberal?—Firstly, in the methods on which the assets are calculated at standard rates: up to the Meerut settlement of about the end of last century the standard rates in Agra were based on the non-occupancy rates; that is to say, the standard of valuation

was practically the competition level. Now, for all occupancy land and proprietary cultivation in Agra the standard of valuation is probably, in the case of occupancy land, about two-thirds of the standard rate, and in the case of proprietary cultivation, 25 per cent. off two-thirds, which is somewhere about half the valuation. That is the first point, the valuation of the land. The occupancy land and the proprietary cultivation are probably now valued at about 40 per cent. less than they were at the end of the last century. Another respect in which assets have been very much more leniently calculated in recent years is the method of dividing the land into wet and dry. Looking at the old settlement records one finds that in the settlement of the eighteen-seventies and the eighties the land classed as wet was in most cases something about 80 to 100 per cent. above the average irrigated area. If one looks at a modern settlement one finds that the land classed as wet is about 30 per cent. above the average irrigated area. Those are the two points with regard to the question of the valuation of assets. In the eighteen-seventies there was hardly any allowance given for proprietary cultivation; now every proprietor who cultivates his own land is allowed 25 per cent. off the gross assets before the value of his land is actually calculated for assessment of revenue. The allowance for improvements is also more liberally applied than it was.

35,590. Taken in terms of percentage of the outturn, you say under the present rules, the land revenue is as low as 2 per cent. of the value of the annual produce?—Yes.

35,591. What percentage was it in former years?—There is a statement at the end of the Report on Agriculture in the United Provinces which I think brings that out pretty clearly. It goes back to 1840. The process has been going on steadily since then.

35,592. I see that your claim was 20 per cent. in 1840?—Yes, it was about 20 per cent. of the value of the outturn in 1840, and the process has gone on; as prices have risen, the value of the produce has naturally risen, but the revenue has not risen at all in anything like the same proportion.

35,593. You say on page 204 of your written evidence: "Government can also reduce the need of the agriculturist to borrow by shaping their land revenue policy in such a way as to leave with him as much as possible of the surplus which he earns." Is your land revenue policy shaped with the intention of preventing the agriculturist borrowing?—No, but that is one of the effects of it. It is fairly clear that if you leave more money in the pockets of the agriculturist, he has less need to borrow.

35,594. Even supposing you did not take 2 per cent. of his outturn, he would still borrow?—Presumably, yes; I should think he will always borrow.

35,595. Then, is it a sound policy to shape the land revenue policy in such a way as to prevent the agriculturist borrowing?—I do not say it is shaped with that intention; but by that means Government can also reduce the need of the agriculturist to borrow.

35,596. I want you to explain the percentages of surplus which appear in table "K" on page 115 of this Report on Agriculture. Taking the Jhansi Division as an instance, you say that the cultivating proprietor has a surplus of Rs.98 left after making allowance for his food, clothing, etc. Is that figure of Rs.98 in respect of a family of four or five persons?—It is the total surplus of a holding.

35,597. For a family?—Yes.

35,598. That is to say, it has to be divided by four or five?—Yes, it is for the whole family; it is the surplus on the holding.

35,599. You have not made any allowance for any other items of expenditure except food and clothing in the family budget of a cultivator?—There is a full description here of what has been included and what has

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not been included; there is a certain amount left out on both sides. It does not pretend to accuracy; it is quite impossible to get accuracy in these things; it is merely intended to indicate tendencies and to enable anybody reading it to draw conclusions from economic conditions which arise from different sizes of holdings.

35,600. It is not based on the examination of actual family budgets of cultivators?—I do not quite know where you are going to get a cultivator's family budget.

35,601. At any rate, no allowance has been made for expenses of such things as marriages and funerals?—No, it is quite impossible to estimate them.

35,602. Or litigation?—No, anything which it is quite impossible to estimate has, of course, been omitted; we have included anything which we consider can be estimated with reasonable accuracy; anything which varies from year to year or with the individual, or as to which it is quite impossible to get figures, we have omitted. That is mentioned in the letterpress.

35,603. I want to find out whether certain legitimate expenses which every family has to incur have been allowed for when you claim that cultivators have a surplus?—But we do not claim that cultivators have the surplus shown; we claim that, leaving out these things, this is the figure. Everything that is left out is described here; seed, *bhusa* and litigation are left out.

35,604. If all these things are deducted, then what may be a surplus may perhaps be even a deficit?—It may be anything.

35,605. *Professor Gangulee*: When you talk about an average holding what do you mean? What is the area?—It is described in the provincial memorandum. It is based on the area of the land the cultivating household has got. The average size of the holding is shown in table "F".

35,606. *Mr. Pim*: You said in answer to Sir James MacKenna that in the case of improvements made within the period of settlement Government never gets any share of the increased assets resulting from the improvement, though the revenue may be revised in case of deterioration. Is owner's rate a partial exception to that?—Yes; if a new canal is brought in Government gets the owner's rate certainly. I was thinking of the revenue assessment actually.

35,607. As regards the allowance for improvements made at settlement, the general effect of the rules is that the additional asset caused by the improvement should not be assessed at the next settlement. Is there any period within which the improvement must have been made?—Under the new settlement rules?

35,608. Yes?—I think it is thirty years; I do not remember exactly.

35,609. There is a sentence at the top of page 205 of your note. You say with regard to the Land Alienation Act: "The problem is difficult and opinion differs considerably on the desirability of such a measure in the United Provinces." That is of course, broadly speaking, true. But is there not one part in the United Provinces where there is such an Act?—There is an Alienation Act in force in Bundelkhand and the southern parts of the districts of Etawah, Allahabad and Mirzapur.

35,610. Do the reports so far show that it is working satisfactorily?—Yes.

35,611. Another witness has said that he did not think there would be any serious disadvantages from making over the assessment and collection of irrigation rates to the land revenue staff, the irrigation staff simply taking their figures from the land revenue staff. What would you think of

such an arrangement?—I think it would be fatal from the point of view of the canal revenue because, for one thing, you have under the present system one set of records checking another, and another point is that the *amin* is a Canal Department man and the *patwari* is intimately connected with the interests of the village. He is appointed on the recommendation of the landlord and his tendency would certainly be to fail to write up a good deal of the irrigated area.

35,612. *Sir Henry Lawrence*: Is there any part of this Province where there is a shortage of labour?—I could not say off-hand. It is not a question with which I am familiar.

35,613. Do you know what the ordinary rate of wages for field labour is?—It is reported that in the Meerut Division it is about 6 annas for a female and 8 annas for a male and elsewhere it is 4 annas for a female and 6 annas for a male.

35,614. One witness from one district has told us it is 1½ annas for women and children and four annas for a man?—In what part of the Province?

35,615. *Rae Bareli*?—It is quite possible that those rates might be paid by the landlord; but they are not the market rates—

35,616. *The Chairman*: How comes it that the landlord gets his labour below the market rate?—He makes a *quid pro quo* in some way or other. The landlord can usually dictate terms to the people living in the village. In some estates the landlord has a customary rate of labour; really it is part payment of rent; it varies from village to village.

35,617. *Sir Thomas Middleton*: How is the market rate ascertained?—We ask the Collectors what is ordinarily paid in the villages and that is how we get the information. As far as I know there is no publication in which the figures are quoted.

35,618. *Sir Henry Lawrence*: Is *Rae Bareli* one of the districts where there is severe pressure of population?—It is a pretty highly populated district.

35,619. Are wages generally lower in the east of the Province than in the west?—They are higher in the west certainly and therefore they are lower in the east. I should say in Bundhelkand the wages are lower still; but it is merely a guess.

35,620. Has the Government any definite policy in allowing labour to migrate where there is a severe pressure of population?—I do not think that Government intervenes in the matter at all. There is no question of encouraging or discouraging in the matter, so far as I am aware.

35,621. Is there not a law which restricts emigration from this Province to Assam?—There may be; I could not say. I am not familiar with that Act. I believe there is an Act.

35,622. I understand from a Government Order that Government have restricted the movement of labour to Assam except from five Divisions, including Fyzabad, Allahabad and Jhansi. That means that migration is prohibited over a considerable portion of the Province, does it not?—Yes.

35,623. Does that prohibition extend to districts where there is a severe pressure of population, and where wages are low?—I have no knowledge of the subject. It is not a question I have any experience of. It belongs to the Industries Department and not to the Revenue Department.

35,624. Is there any feeling in the Province that labour is required for field operations and therefore could not be allowed to move out of the Province?—I am not aware of any shortage of labour. In fact the ordinary labourer does not work every day in the year.

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35,625. Is this matter taken up very much by the local press or by the politicians?—Shortage of labour?

35,626. The desirability of maintaining labourers on the land?—I am not aware of any discussion.

35,627. You do not know of any strong public opinion in the matter?—No. There is always a public opinion against anything in the form of indentured labour, but the reasons, I think, are not economic.

35,628. There is no indentured labour here?—No; there is a feeling against anything which tends in that direction.

35,629. Is there any particular prejudice against migration to Assam on those grounds?—That I cannot say.

35,630. Have you heard of it?—No; I have not heard of it. Do you mean political prejudice?

35,631. Political or economic or whatever it is, is there any?—All I know is there was an agitation against the Bihar estates getting the labour. It was one of the points in non-co-operation times.

35,632. But the conditions in regard to Bihar are quite different from those in regard to Assam?—Yes.

35,633. There is no restriction with regard to Bihar, but there is restriction with regard to Assam?—I am not familiar with the reasons.

35,634. You have just now told us that District Officers are not very closely in touch with the districts owing to retrenchment in touring?—That is one of the reasons, I think.

35,635. Has the touring grant been very largely cut down?—I cannot give you the figures, but certainly the periods have and the grant has.

35,636. The period of the touring is reduced by Government orders?—It is reduced presumably because the grant for it is not forthcoming.

35,637. Was the grant cut down by the vote of the Council?—I really could not tell you the history of the matter. Why it was cut down and whether there was actually a cut in the budget I could not say.

35,638. In this Province, is the time of the District Officer largely occupied with magisterial or criminal work?—Not of the District Officer, no. The Collector and District Magistrate only takes up important cases. He has got certain appellate work, but the original criminal work the District Magistrate would not take up unless there are special reasons for doing so.

35,639. The work of the Assistant Collector is mostly magisterial?—Yes, plenty of it; he has got a heavy file.

35,640. Both in Agra and Oudh, this is the case with the Assistant Commissioner and the Assistant Collector?—Yes, he has got a great deal of case work to do. In the bigger places, in Lucknow for instance, there is a City Magistrate, and my own experience is that the average Sub-divisional Officer has got a pretty heavy file of criminal as well as revenue work.

35,641. Does it occupy, say, 40 or 50 per cent. of his time? Can you give me a figure?—In court hours, I should think 70 per cent.

35,642. That also diminishes his zeal for prosecuting economic inquiries?—The ordinary officer when he is out in camp, goes out to the villages in the morning and sits in court during the day. When I say 70 per cent., I mean of the actual time spent in court. What generally happens in practice is that he spends most of his court time on criminal work, and what time he has left he devotes to revenue work.

35,643. Would you like to see him relieved of his magisterial work in order to put him in touch with the economics of his district?—That would

be a doubtful policy. A lot of other considerations come in. It is a very big question, and I should not like to express an opinion offhand. There are many obvious disadvantages.

35,644. Do I understand that in your opinion there is no difficulty felt by landlords or tenants in improving their agricultural holdings owing to the fear of taxation on improvements?—I should say none. There is very little fear of that, I should say. They might not do it just before a settlement, but I think it would be incorrect to say that the fear of having the revenue assessed on improvements is any drag on the making of improvements.

35,645. And is capital actually being invested in the improvement of land?—Certainly.

35,646. Is there a continuous process going on?—A very large number of wells are dug every year. There has been a tremendous development in well construction during the last thirty years.

35,647. Before settlement comes on, is there any retardation of improvement, say, in the cropping system?—I should not say so; there is no indication of it. In the district which I have settled, where there is a tendency to introduce improved crops in the way of new Pusa wheats, there is certainly no indication that the villagers were afraid that the introduction of improved crops would mean a heavier assessment. The reason for this is that the assessment is made on the rent; it is not made in this Province on any estimated outturn. There is no estimate made of the value of the crop at all. We work on the basis of the existing rents.

35,648. How would that apply to assessment on sir land, home-farm land?—It is impossible to say what suspicions the landlord might have at the back of his mind against the Settlement Officer, but I cannot imagine that it constitutes any check on the development of agriculture; all the indications which I have seen are in the opposite direction. Even in districts where it is known that the settlement is pending, especially in the Meerut Division, the people have gone on steadily introducing improved crops.

35,649. We have had evidence before us which was just the other way, in fact one landlord definitely told us so?—There are landlords like that, but they are not common.

35,650. *Sir Ganga Ram*: How many districts are permanently settled in these Provinces?—Benares, Jaunpore, Mirzapore, part of Ballia. There are also scattered areas in Oudh which are permanently settled.

35,651. In these districts are the settlements governed by the same rules as obtain in Bengal?—There are rules as regards the tenant and the landlord, and the Agra Tenancy Act applies.

35,652. Can the landlord take any rent from the tenant, or is the law of tenancy laid down there?—They are governed by the Agra Tenancy Act.

35,653. The rent which he can take from the tenants is regulated by some law, is it not?—What happens is that a very great number of the tenants are fixed rate tenants; their rent cannot be enhanced.

35,654. But the rent that they take from the tenants is recognised by law, is it not?—The rent is not fixed by law, but the law regulates that there cannot be any enhancement to the rent of a fixed rate tenant.

35,655. I had occasion about ten years ago to visit a village in the Darbhanga district of the Province of Bihar and Orissa, and I found the tenant was being charged Rs.15 an acre, whereas the landlord was only paying 3 annas per acre? Can the landlord charge any amount he likes?—He can charge anything he likes provided the land is not fixed rate, ex-proprietary or occupancy land. If it is non-occupancy, he can charge anything for it.

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35,656. And in the case of occupancy?—That is liable to regulation.

35,657. In these Provinces, is a man with occupancy rights subject to the law of inheritance or the Hindu law?—It is a special law of succession; it is not the Hindu law of succession. The order of succession to tenants is a special order of its own. It is given in the Tenancy Acts. It is not quite the same as the ordinary Hindu law, but it is very like it. It is different in some details.

35,658. On page 204 of your note, you say that the number of masonry wells in the Province has increased from 302,000 to 441,000 in the last 30 years? Is that right?—Yes, those are the figures.

35,659. If I am wrong please correct me. I take it that it amounts to something like 4,600 a year?—I suppose it does.

35,660. And you might put down, say, five acres of protected area under each well. It would not protect more than five acres, would it?—Perhaps not.

35,661. My calculation is that, taking 50 million as your population and after deducting all the areas that you have protected, you have still to protect 10 million acres of land which still remains unprotected at present. The Sarda canal, I understand, is only going to protect 300,000 acres, and it cannot protect the remaining portion. I may be wrong in my calculation, I am not sure, but you might tell me?—Government does not undertake to convert the whole of the dry area into wet. Government are pushing the thing forward as much as possible so far as funds are available; the Sarda canal scheme is costing a great deal of money.

35,662. But that would only protect 300,000 acres?—I was under the impression that it was a good deal more.

35,663. Then, another question has been asked by my colleague and it has been answered, but I want to go into the figures. You say that under the new settlement rules the land revenue will be as low as about 2 per cent. of the value of the annual produce. Formerly it was one-sixth or 16 per cent. It is given in Lord Curzon's land policy?—There have been very big changes since the year 1901, that is during Lord Curzon's time, not only in the revenue policy but also in the rise in prices.

35,664. Has it come down to 2 per cent. now as you say?—Yes.

35,665. That leaves 98 per cent. for other people. Can you give us a rough idea as to how the 98 per cent. is disbursed, that is to say, how much to the landlord, how much to the tiller and how much to the bullocks? Could you work out these figures and send them to us?—The figures are already given.

35,666. What I mean to say is this, that if Government takes 2 per cent., then 98 per cent. of the gross produce is left to the other people. What is the detail as to the disposal of this remaining 98 per cent.? You have been a Settlement Officer, and I am asking you this because of that fact?—Table J of the Report on Agriculture in the United Provinces is as far as we can get to. It gives the cultivators' expenses, the rents and the revenue.

35,667. I want to reduce it to figures?—We cannot give any more figures than have been given in the last chapter of the report, because it depends on the individual cultivator.

35,668. Are the minor streams supposed to be the property of Government or the property of the adjoining villagers? Can anyone put up a pump and take the water without the sanction of Government, or is it necessary to have Government sanction?—They are not Government property. The stream belongs to the landlord. If there are two villages, one on each side of a stream, the dividing line between the villages is in the middle of the stream; the stream is not Government property.

35,669. Can anyone put up a pump and take the water?—If the landlord will let him; it is his property, and he can do what he likes with it. It has nothing to do with Government at all.

35,670. In the Punjab, all that is governed by the Drainage Act or some other Act?—I am not aware of it. I know several pumping schemes on the edges of streams. I have not heard of any provision of the law which prohibits a private individual from putting up a pumping scheme on the edge of a stream.

35,671. *Mr. Calvert*: Is that the case with forest streams?—It is not the case with streams inside the forests, but here I am thinking of agricultural land.

35,672. *Sir Ganga Ram*: In agricultural land, there is no prohibition?—I am aware of none.

35,673. If the stream passes through the properties of a number of persons, can the man in the upper reaches of the stream pump up the water to the detriment of the persons further down the stream?—No. There is a provision in the Canal Act which enables Government to notify as regards certain areas that they are controlled by the Irrigation Department. The position is that Government can, if they consider it necessary, assume control of a certain stretch of river, but until they do so there is no control by Government.

35,674. When you make survey maps for your settlement purposes, would it not be advisable to put the contours on it, say, five feet apart, so as to show at a glance how the lay of the land is?—For whose information?

35,675. In your settlements you make survey maps of each *tahsil*?—We make survey maps of each village.

35,676. So much the better. I only suggest that you should put on the map contour lines, five feet or two feet apart, so as to show everyone how the land lies, so that he can know where to take the water, and how to take it?—For whose information is this? For the cultivators' information?

35,677. For everybody's information; everybody will be enlightened by that system?—I think the cultivator would know much more how to take the water by looking at the ground than by looking at the map.

35,678. *Sir James MacKenna*: Do you know if the contours are given in the one-inch maps?—I do not think the contours are given in the Government of India survey maps, so far as I am aware. The difference in the levels of an ordinary village will be practically nothing.

35,679. *The Raja of Parlakimedi*: They are given in the district maps?—They are shown in the hill maps, the forest maps.

35,680. *Sir Ganga Ram*: It would be very useful information for purposes of irrigation. They can decide from the contour maps how to take the water. You know that sometimes tremendous mistakes are made?—There is no objection whatever, if the Irrigation Department think that these maps will be of benefit to them, to their preparing such maps.

35,681. For ordinary general purposes, do you not think they will be of use?—I do not know how the *patwari* is to do it.

35,682. He can easily get the information from the Survey of India maps?—These are village maps.

35,683. You can easily reduce it to the village maps?—There are no contours in the Survey of India maps.

35,684. The Act that I was referring to some time ago is the Northern India Canal and Drainage Act. It says: "Whereas, throughout the territories to which this Act extends, Government is entitled to use and control for public purposes the waters of rivers and streams flowing through their

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channels, and all lakes and other natural collections of water. . . ." Are these Provinces governed by this Act?—The preamble you have read out says that Government is entitled to control. In these Provinces, also Government are entitled to control; they can issue a notification.

35,685. In these Provinces, do you think that the cultivators have any spare time hanging on their hands? Is it a problem to find out cottage industries for them?—The cultivator is not working 24 hours a day.

35,686. Is there any spare time in the year which he cannot use profitably? It is put down by some people that for four months and in some cases for six months, he has nothing to do?—He has certainly slack seasons when he is doing little; the hot weather, for instance.

35,687. Have you thought of any method by which he can employ his spare time profitably? For instance, sheep-grazing, or something like that?—There is nowhere to graze sheep.

35,688. There is a lot of spare land?—It is land, but there is nothing on the land. It is bare earth; there is no grass on it.

35,689. *Sir Thomas Middleton*: With reference to the time which Collectors are now able to get for studying the economic conditions of their districts, you have explained that in recent years the Collector's work has been specialised and that his travelling facilities have been cut down. To what extent does the Collector now deal with such other subjects as education, roads and forests, which are specialised departments?—He deals with them more or less generally. References are very frequently made to the Collector by other Departments, and he gives help when it is wanted. In forest matters, generally the Collector has very little to say.

35,690. He helps them generally. Does he do the same in connection with the Agricultural Department?—If the Agricultural Department asks the Collector's help in any way, I think I am safe in saying that it is given.

35,691. Is he in any official sense the centre of the district for all these Departments?—No, I do not think so; it is difficult to answer the question as regards centre of the district.

35,692. There is certainly nothing laid down officially that you know of?—You are thinking of agriculture?

35,693. Agriculture and all the departmental work that is going on. I have instanced roads?—I should not say that there is any definite instruction on the point. It is a point which is regulated by custom; there are certain things which require a definite reference to the Collector.

35,694. *Sir James MacKenna*: What about the Commissioner of the Division?—I do not think if an agricultural officer wanted to have anything done he would go to the Collector; I think he would recommend it to the Commissioner.

35,695. I was thinking of the other branches of the administration, the Forest Department and the Public Works Department?—What happens is that in some cases for local matters they go up to the Collector, and it comes up to Government through the Commissioner.

35,696. *Sir Thomas Middleton*: You mentioned, I think, that the man who is doing settlement work has much better opportunities of coming into close touch with the agricultural and economic matters than the Collector?—He is out for five months at a stretch without getting back to headquarters, and the whole of the time he is out in the villages. He is out every day at 7.30 in the morning, and does not come back till 4 in the afternoon.

35,697. How often do the settlements recur in these Provinces?—Thirty years; now it will be forty years.

35,698. About how many settlements would be in progress in the Province at a time?—There are seven now; it depends on the programme.

35,699. How many districts have you?—Roughly fifty. Some of them are permanently settled; there are no settlements in the Benares Division.

35,700. You have explained that your settlement starts on the basis of the existing village maps and papers. These village maps in the United Provinces are, I think, pretty old. When was your cadastral survey made? When were the village boundaries laid out?—They are pretty old. I could not say when the village boundaries were laid out.

35,701. These village boundaries were no doubt laid out working on the triangulation method of the topographical survey. Have you any reason to suspect that these village boundaries may be inaccurate?—Not substantially; not enough to make any difference for the purposes of the Revenue Department, certainly.

35,702. When you do your field surveying, do you find that the field boundaries have changed?—There is a difference in areas.

35,703. Are these differences in areas substantial?—Not very much.

35,704. Errors of 5 per cent. would be common?—I should think not 5 per cent.; we very seldom find anything as big as 5 per cent.

35,705. With reference to the question put to you by Sir Ganga Ram about levelling, I do not think your settlement parties are provided with levels?—No. They would not do levelling at all; they are not trained in that way. The surveyor is the *patwari* himself, and he is not trained in any way to take levels.

35,706. What does he work with?—A chain, a right angle and a compass.

35,707. What is the longest period for which you grant loans for permanent improvements?—There is no limit. The ordinary period is ten years, but if it has to be extended to over twenty years Government sanction is it can be extended to twenty years with the sanction of Collectors, but if it has to be extended to over twenty years Government sanction is necessary.

35,708. The ordinary period is ten years?—Yes.

35,709. So that the sinking fund will be pretty heavy?—Yes.

35,710. Have any complaints been made of the short period for which loans are given?—I have never heard any at all.

35,711. The point has not been taken up?—I do not think there is any indication that it is considered too short a period. There is no indication that there is any unwillingness to go in for *taccavi* loans on account of the short period.

35,712. You do not think that the sinking fund required for a repayment in ten years has restricted the development of wells, for example?—I do not think so.

35,713. Has any one attempted to estimate the charge in these Provinces, which the indebtedness bears to the gross produce, the interest charges?—If you mean agricultural indebtedness, I do not know. It is quite impossible to make a reliable estimate.

35,714. Did Mr. Moreland make no attempt to estimate it at all?—He may have. I am not familiar with that.

35,715. At any rate it is clear that it must be many times greater than 2 per cent.?—Certainly.

35,716. Can you mention a probable figure?—No.

35,717. Would you think a figure of 40 per cent. excessive?—I have no information. If I gave a figure, it would be purely guess work.

35,718. How much of the gross value goes into the payment of interest?—I do not believe anybody knows at all, even approximately, what the total indebtedness is.

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35,719. If anyone made such a statement would it surprise you?—I should ask him where he got the information from.

35,720. You would not accept such a statement without inquiry?—No. I would not venture myself to mention any figure in that connection.

35,721. Is it your argument that the Government cannot finance the cultivator directly?—Yes, it is quite obvious.

35,722. Therefore, in attempting to improve agriculture the only way in which Government can come in is by attempting to control the rate of interest?—Yes. We have got the Usurious Loans Act; we have got the competition of the co-operative credit society. These are the two methods.

35,723. Have any other methods been suggested at any time for controlling the rate of interest?—I am not aware of any.

35,724. *Sir Henry Lawrence*: How long does it take to finish a settlement?—It generally takes about 2½ to three years now. It used to take seven years before.

35,725. *Sir Thomas Middleton*: Do the papers of the Agricultural Department pass through your Revenue Department?—No. The Agricultural Secretary is Secretary in the Education Department.

35,726. *Raja Sir Rampal Singh*: Do you in normal years distribute *taccavi* for seeds and bullocks?—Yes. The actual figures of *taccavi* for recent years are given in the provincial memorandum.

35,727. Is that for improvement?—No, loans under Act XII are almost entirely for seeds and bullocks. Loans for machinery come under this Act, but not for wells.

35,728. Owing to the hardship which the cultivators have to bear in paying back these *taccavi* loans, would it not be better to distribute *taccavi* through co-operative societies?—I think, from the point of view of Government, what one wants to know is whether the co-operative society is able to pay back its debts. Our experience in the Revenue Department is that so many of these banks go into liquidation. They borrow a *kurk amin* to liquidate their debts, and the Revenue Department pays for the *kurk amin*, and the Co-operative Department takes whatever he can collect. It seems to me that before you undertake to distribute *taccavi* through co-operative societies you have got to be pretty certain of their financial stability.

35,729. What I mean to say is that if such encouragement be given to the co-operative society, money may be advanced to the co-operative society on the joint responsibility of the members, and the members may distribute it among themselves—

The Chairman: So that only the members would get the advantage?

35,730. *Raja Sir Rampal Singh*: Yes. It is a general practice that cultivators who cannot obtain loans from the *mahajans* and other places apply for *taccavi*?—Yes.

35,731. So if some such measure be adopted by Government, I think it will stimulate the co-operative movement a great deal?—Yes, it might.

35,732. I should like to know whether this system of *nazarana* was in force before the Act of 1886 was passed by the Government?—The Oudh Amendment Act?

35,733. Yes. Was *nazarana* taken before that?—Yes, I should say it was.

35,734. Do you think before that more *nazarana* was taken than at present?—I cannot tell.

35,735. Are not the landlords compelled to take this *nazarana* because of the limitation of rent enhancement?—It is one of the reasons. *Nazarana*

takes so many forms, it is difficult to say. *Nazarana* is not merely a premium for rent facilities. It is taken for a lot of other things.

35,736. In your reply to the Questionnaire you say that the number of agricultural wells in the Provinces has increased to 441,000. Does this number include wells constructed by the landlords, or is it only for those wells which have been constructed from the *taccavi* advanced by the Government?—That is the total number of wells.

35,737. So that it includes those wells also which have been built by the landlords?—Yes.

35,738. Is there any statement showing how many wells have been built by the landlords within the last thirty years? Figures are not given separately anywhere?—I do not think there are separate figures showing the wells built by landlords and wells built by tenants. There is no record of that.

35,739. As far as your knowledge goes, do not the landlords build wells in their own villages, or help the tenants to build wells?—Landlords and tenants both build wells. If the tenants have rights in their holdings they do a good deal of well construction. Landlords certainly do quite a lot.

35,740. Is it not a practice in villages, except in some special cases, that the landlords have to give fuel and all other things and to help the cultivator in building these wells?—I believe the landlord very often does help the cultivator in the construction of wells.

35,741. Who reports the wages of the labourers to Government?—They are reported by the District Officer.

35,742. Is there any difference between the wages that prevail in cities as compared with those in villages?—I should certainly think so.

35,743. Is it not a fact that in towns wages are always high, much higher than those prevailing in villages?—I should certainly think so.

35,744. Is there sufficient incentive to the landlords to make improvements in their estates or in their properties?—The chief incentive is the extra profit.

35,745. You give certain concessions at the time of settlement, but not at the time when the construction is made. Is any incentive in this direction given to the landlord?—I do not think any concessions are given, but I do not quite understand what you have in mind. The incentive, I understand, is that if the landlord makes improvements he gets increased profits, and Government does not tax him on the increased value due to the improvement.

35,746. My personal experience as a landlord is that there are times when the landlord finds great difficulty in getting his rent, and has to make certain improvements to maintain the same rent as before. He cannot enhance the rent, and even the old rent could not be maintained without some improvement?—Yes.

35,747. Before the tours of District Officers were curtailed, were the officers in greater touch with the village people than they are now?—They must have been more in touch. The Collector in a big district now does practically no touring at all. His work at headquarters is heavy, and he has no time to spend four or five months a year in camp. In these circumstances he cannot be so much in touch with the agricultural population as he was when he spent four or five months on tour.

35,748. My question is, is it only since the non-co-operation movement that these tours of District Officers have been curtailed? Before that were they more in touch with the village people?—It is inevitable that if they

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are not moving about freely among the people they must be less in touch with them.

35,749. Was there not some distrust amongst the villagers about these tours, because they had to suffer much harassment and trouble?—I should say this discontent comes partly from the politician and partly from the Bar. The local Bar does not like the Collector to be out in camp hearing cases, and it does not suit a particular type of political thought. There may have been individual cases in which the touring officer was unpopular, but, generally speaking, I should say the villager very much prefers the Collector to tour more freely.

35,750. *Sir Henry Lawrence*: Is it in the interests of the villagers that the Collector should tour more freely?—Yes.

35,751. In what way?—The Collector by touring gets to hear things personally, he gets a much more intimate knowledge of what is going on, and his knowledge is first hand.

35,752. That is from the Collector's point of view?—Yes.

35,753. From the villager's point of view, in what way does the villager profit by the Collector touring more?—He profits by virtue of the fact that there is much more control over the local petty official and abuses are less likely to happen; and I suppose if the Collector is more intimately acquainted with conditions in the villages, it is more probable that he will further schemes for the improvement of villages and take more interest in the advancement of village life generally.

35,754. *Sir James MacKenna*: It often saves the villager a visit to headquarters?—Yes.

35,755. *The Raja of Parlakimedi*: Complaints are more easily disposed of?—Yes; it is very difficult to put it into language, but the advantages of a close personal touch appear to be clear enough.

35,756. *Raja Sir Rampal Singh*: You say that formerly Collectors used to tour a great deal in rural areas. Were they doing any service to the villagers in those days, helping the villagers in agricultural improvements or hygienic conditions? Of course, they could also exercise more control over the petty officials; but were they rendering any other service?—I think the advantage really lay in the better working of the general administration; I do not say there were any visible signs of sanitation schemes in villages or things of that sort, but I think the welfare and general prosperity of the villager is very closely bound up with the efficiency of the district administration; if the Collector is in close personal touch with what is going on and is able to control the general working of the district by personal contact, the villager is inevitably a good deal better off than if the administration is getting lax and things are generally not so efficiently run.

35,757. Before the reforms were introduced these Collectors had to do a great deal of work in connection with District and Municipal Boards?—They were the chairmen, yes; they were responsible for the general administration of District Boards.

35,758. Now they have been relieved of those duties?—Yes, but that does not mean that the Collectors have ceased to have any work in connection with District and Municipal Boards.

35,759. I should say very little now as compared with those times?—That is a matter of opinion; I have not any personal experience, but one does occasionally hear it stated that the position now is that the Collector is responsible for what is going on in his district; in many ways it was very much easier for him before; being in charge as official chairman did not

really appreciably add to his work as compared with what he has to do now; the work is now much more difficult. You may say that the Collector is no longer the official chairman, and it may sound as if therefore he had no connection with District and Municipal Boards, but I believe the facts are quite otherwise.

35,760. In your statement you say it is now the policy of the Government to take only 2 per cent. of the value of the annual produce. What proportion will it be of the net yield of the Province?—I cannot give you anything more than the figures in the last chapter of this memorandum; the whole thing is worked out there. It varies from district to district.

35,761. What proportion of the net assets did the Government take at the time of summary settlement?—The original percentage of the assets which the Government took, right at the beginning of British rule, was 90 per cent.

35,762. Then after that it began to take a more liberal view?—It came down gradually.

35,763. I have in mind the note of Sir Harcourt Butler; I think the policy of Government has gradually become more and more liberal?—I am quoting from the Report of the Settlement Committee: "The British Government found this percentage of assets unrealisable in practice and it was reduced gradually through succeeding stages. Regulation VII of 1822 fixed it at 83 per cent., Regulation IX of 1833 at two-thirds, and the Saharanpur Rules of 1855 at half the net assets." It has remained theoretically at this level up to the present time, but in fact the percentage of assets taken in the recent settlement has been between 43 and 45 per cent.

35,764. At the time when the summary settlement was made, I believe there was great scope for the cultivation of new lands?—Yes, certainly, when the original settlements were made.

35,765. A very large area has come under cultivation within the last 100 years?—Yes.

35,766. Is there great scope now for more land to be brought under cultivation?—No, there is not a very big scope for extension of cultivation.

35,767. There may be a thousand acres or so in Oudh; there is not much?—No, generally speaking, there is not a great scope for the extension of cultivation in the ordinary districts of the United Provinces.

35,768. Perhaps it may be admitted that all that area was brought under cultivation owing to the exertions of the landlords, possibly because of over-population?—I personally should rather attribute it to the exertions of the tenants, not of the landlords.

35,769. You have been a Settlement Officer; is it not a fact that zamindars have given land and help to tenants?—They have given land, but, of course, they have charged rent for it.

35,770. But have not the landlords given help in founding hamlets?—They do sometimes; it depends whether the landlord is particularly anxious to get fresh tenants or not; it depends how the competition is; in a tract where the competition is for tenants, the landlords will go a long way to get tenants; on the other hand, if the competition is for land and not for tenants, the landlord certainly does not go out of his way; he does not have to go out of his way.

35,771. I believe this competition for land has arisen within the last fifteen or twenty years?—It has certainly become much greater within that period; it varies from district to district according to the population.

35,772. Has any calculation been made as to what ratio the average rent bears to the annual yield of the tenant?—Will you look at tables "G" and

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"J" of Chapter XXVI in the Report on Agriculture in the United Provinces; it is all there; that is the only estimate I can give.

35,773. Is it possible to eliminate the moneylender altogether from the village economy; I mean would it be beneficial to agricultural operations?—It depends what you substituted; if you could finance the whole of agriculture at lower rates of interest, it would certainly be beneficial.

35,774. Of course, but as long as such steps are not taken, is the moneylender necessary?—Unless other arrangements are made for financing agriculture, I think the moneylender is a necessary evil; I do not see how you can get rid of him; the cultivator has got to be financed somehow, the money has got to be found, or else the cultivator has got to have more money himself so that he will not want to borrow.

35,775. There must be some special reasons for these moneylenders taking such high rates of interest; I mean that owing to the risk and the excessive litigation expenses, especially at the time of the execution of decrees, moneylenders have to charge high rates in order to compensate themselves for the losses they have to incur. Would it not be justifiable for Government to take steps in that direction with a view to benefiting the cultivators?—To facilitate the execution of decrees and that sort of thing?

35,776. Yes, if possible; it is only a suggestion?—I certainly think there is room for improvement in the method by which decrees are executed.

35,777. *The Chairman*: On this question of the possibility of distributing *taccavi* loans through co-operative organisations, it may be well to bring the matter into its right proportions. Do you know that there were 115,149 members of primary credit societies last year, whereas it is estimated that there are 7,125,000 heads of households in the rural areas?—Yes.

35,778. That is to say, the present membership of the primary societies amounts to about 2·18 per cent. of the total rural population which might conceivably become members?—Yes.

35,779. So that in the meantime the opportunities of meeting the needs for *taccavi* loans through primary societies would seem to be rather limited?—Yes.

(The witness withdrew.)

SARDAR KIRPAL SINGH, Sardar Nagar, Gorakhpur.

Replies to Questionnaire.

QUESTION 2.—*Agricultural Education*.—(i) This is not sufficient. In the United Provinces there is only one college in Cawnpore.

(ii) There are no facilities for agricultural teaching in Gorakhpur.

(iii) Preferably, but we should not confine to agricultural classes alone, we must take the best we could get.

(ix) No career worth the name is open to students.

(xii) This can be popularised by giving lands to deserving students from Government reserves.

QUESTION 3.—*Demonstration and Propaganda*.—(a) Personal example set by big zamindars who take interest in the subject.

(c) Zamindars should be encouraged to start demonstration farms in each village or in a central village easily accessible to surrounding villages.

(d) In our own farm we have made experiments with improved cane varieties and wheat, and both are successful.

QUESTION 4.—*Administration.*—(c) (i) No, these are not sufficiently available.

(ii) The present rates on seeds and fertilisers are very excessive and they should be greatly reduced.

(iii) Roads are not sufficient. More *pucca* roads should be built, and no such roads exist in the *mofussil*.

(iv) Forecast report of the department should be more widely circulated in vernaculars of the Province, and, if possible, reports pertaining to districts should be attempted.

QUESTION 5.—*Finance.*—(a) *Taccavi* loans should be given for a good breed of cattle, seed and wells.

QUESTION 6.—*Agricultural Indebtedness.*—(a) (i) The main cause of borrowing is that when the agriculturist wants money, it is not available, nor can any bank advance money against his standing crops. So he has to go to a petty moneylender.

(ii) Petty moneylenders.

(iii) When the crops fail.

(c) The more you restrict, the more evil practices will increase.

QUESTION 7.—*Fragmentation of Holdings.*—(a) Holding should not be subdivided beyond 10 *bighas*.

(b) Small occupancy holdings and their subdivisions and inherent habit of people against migration.

(c) Present law is more than sufficient.

QUESTION 8.—*Irrigation.*—(a) (ii) The water of tanks, ponds, *jhils* and rivers should be utilised with the help of pumps.

(iii) The use of tube-wells should be more popularised and larger grants on smaller rates should be granted for this purpose. The present rate of *taccavi* is too high. For small areas *pucca* wells with Persian wheels will be more useful.

QUESTION 9.—*Soils.*—(a) Soils become poorer for want of manuring and ignorance of the use of fertilisers.

QUESTION 10.—*Fertilisers.*—(a) This can be improved by stoppage of the export of bones and oilcakes and oilseeds. By improving cow and buffalo breeds agriculturist will get good bulls as well as food and manure for his field.

(c) The use of chemical fertilisers is good to some extent, but it would be beyond the capacity of the cultivators in respect of money, understanding and application.

(e) I do not think these manures have been tried thoroughly.

(f) Facilities should be given by Forest Department for cheap fuel from Government forest.

QUESTION 11.—*Crops.*—(a) (i) Supply of better quality of seed.

(iii) Help of zamindars to be taken for this.

(iv) Bulls and monkeys to be controlled. There should be some fund for the maintenance of the bulls, and old and useless bulls should not be let loose.

QUESTION 12.—*Cultivation.*—(i) No improvement could be suggested unless plough cattle are improved.

(ii) The present rotations are quite enough.

QUESTION 14.—*Implements.*—(a) Agricultural implements are too costly, something should be done for local production.

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QUESTION 15.—Veterinary.—(a) Better if under the Director of Agriculture, and there will be more co-ordination.

(b) (ii) No.

(c) (i) No veterinary dispensary worth the name is available.

(ii) Never heard of any such dispensary coming to our place.

(d) More veterinary doctors should be available for the district.

(e) We never got serum.

QUESTION 16.—Animal Husbandry.—(a) (i) Better bulls and stoppage of deluge of inferior Brahmini bulls.

(ii) No such industry in Gorakhpur.

(iii) No proper feeding of cattle.

(b) (i) No pastures in the district of Gorakhpur.

(iii) Quite insufficient.

QUESTION 17.—Agricultural Industries.—(a) The men are too busy during the year to find time for anything else.

(b) All are engaging in the work.

(c) In Gorakhpur for men to touch eggs and fowls is disgusting.

(d) Every leaf is used in feeding cattle. Oil, sugar and rice factories should be encouraged.

QUESTION 18.—Agricultural Labour.—(a) We want our surplus to be provided for elsewhere.

(i) and (ii) None in Gorakhpur worth the name.

Oral Evidence.

35,780. *The Chairman:* Sardar Kirpal Singh, you are from the district of Gorakhpur in the Central Provinces?—Yes.

35,781. We have got the note of the evidence which you have been good enough to prepare for us. Is there anything which you would like to add to that at this stage or may we ask a few questions?—You may ask questions.

35,782. Turning to your note in answer to our Question 2, Agricultural Education, you say, "No career worth the name is open to students." Are you thinking there of a career in the services or of a career in the business of agriculture?—A career in the services.

35,783. Do you think that agricultural education should be regarded as a qualification for practical farming as well as for recruitment in the services?—It should be for practical farming, because students coming out from the colleges do not know much about practical work. They are not of much use on the farm.

35,784. When you say that they are of very little use on the farm, do you speak from personal experience?—Yes. Many a time the students have come to me, and when I put them some questions on farming they say they do not know anything. They do not know anything about practical farming in the fields.

35,785. You mean they have no knowledge of farm management?—Farm management can be achieved after some time; but first they should know how to do the work.

35,786. You mean if you give them a task to supervise they do not know enough to do that?—Yes; they do not know when the plant requires watering and that sort of thing. They may have read a good deal, but when they go actually to the field they do not know how to do the work.

35,787. You think it is the difference between theory and practice?—Yes, a good deal.

35,788. Does that suggest to your mind that agricultural education might be strengthened on the practical side?—Yes, it should be.

35,789. Would you tell the Commission something about the extent of your own holding in land, how much land you own?—I do not own any land, but my father owns land.

35,790. Would you tell us about your father's ownership in land?—In the United Provinces my father has got about 10,000 acres.

35,791. What is the extent of the land which he farms himself?—About 600 acres.

35,792. Does he farm that by paid labour?—Yes.

35,793. Paid in cash or in kind?—Cash.

35,794. Cash entirely?—Yes, entirely cash.

35,795. What wages does he pay?—A new man gets 4 annas a day and the man who stays in the farm for two years gets about 6 to 8 annas.

35,796. Is that, you think, the ordinary market rate for labour in those districts?—Yes.

35,797. I see that on your father's farm you have made experiments on improved cane varieties and wheat; are those two crops the main crops?—In our farm they are the main crops; we also grow gram and rice.

35,798. What wheats do you grow?—Pusa 4 has been found to be the best in our place.

35,799. And canes?—213 Coimbatore.

35,800. How long have you had that on the farm?—For about five or six years.

35,801. Are you satisfied with it?—Yes.

35,802. You see no signs of deterioration either in the wheat or in the sugarcane?—No, not till now.

35,803. Do you manure your wheat land?—Not much.

35,804. When you do manure your wheat land, what fertilisers do you apply?—So far we have applied cowdung.

35,805. Does that give good result in the case of wheat?—Yes. A little bit of green manure is also used.

35,806. Do you give up a certain amount of land to growing green manure crops?—Yes.

35,807. What do you grow?—Sann hemp.

35,808. Are these lands irrigated?—Yes.

35,809. All of them?—Not all; but specially the farm I am talking about.

35,810. You do grow wheat on irrigated land?—Yes.

35,811. Do you grow any fodder for your working cattle?—Not much; but for our own cattle we grow *bajra*.

35,812. Do you preserve it at all against seasons of shortage?—Not much. We find some difficulty only in two months, but in other months it is quite all right.

35,813. Do you keep any milch cows at all?—Yes.

35,814. What do you feed them on in the season of fodder shortage?—I have never experienced any fodder shortage; but we generally feed them on *bhusa*, gram, *arhar* and such other things.

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35,815. Have you heard at all of the method of preserving fodder by placing it in a pit and making silage?—Yes; we do it.

35,816. Do you find that a success?—Yes.

35,817. Do you give it only to the milch cows?—We give it also to other cattle.

35,818. To the working cattle?—Yes.

35,819. Do they eat it readily?—Yes.

35,820. For how many years have you been practising that method?—For four or five years.

35,821. You think you are likely to continue it with success?—Yes.

35,822. You keep it below ground?—Yes, below ground.

35,823. On page 232, in answer to our Question 7, Fragmentation of Holdings, you say, "Holding should not be sub-divided beyond 10 *bighas*." Do you suggest that there should be a law passed to that effect?—Yes.

35,824. Do you think that would receive a reasonable body of public support?—Whenever any law is passed there are some who support it and some who oppose it.

35,825. So I say a reasonable body. You do not hold any firm view as to the number of people who would agree and as to the number of people who would object?—I think there would be very few who would object.

35,826. You touch on an important point in answer to our Question 8, Irrigation. You suggest that the present rate of *taccavi* is too high?—Yes.

35,827. Do you think that *taccavi* could be financed by Government at a lower rate of interest than that at present charged?—When a work of irrigation is taken in hand, the interest starts to accumulate immediately, though the tube-well is not finished even in two years after starting boring work; and for these two years the man who takes the loan has to go paying interest for nothing, though he does not use the tube-well at all.

35,828. I am asking you whether, having considered this matter from the lender's point of view, you think that the loans can be financed at a lower rate of interest than at present charged?—If the Imperial Bank can give money at a low rate of interest, why not the Government?

35,829. Why not go to the Imperial Bank for the money then?—The Imperial Bank does not give money for agricultural purposes.

35,830. In answer to our question on veterinary matters on page 233 of your note, you complain that you never get the serum. Have you asked for it at all?—Yes.

35,831. Would you tell us the circumstances in which you asked for it?—Last year I lost 25 or 30 cattle of mine. When the disease broke out I asked the doctor to come and see; he came along and said that serum was required, and he wrote for it and he never got it.

35,832. And he never did give it?—No; he never gave it to me, at any rate.

35,833. Was he the local veterinary officer presiding at the district dispensary?—Yes, at Gorakhpur.

35,834. That was last year?—Yes; he said there was no supply to the dispensary.

35,835. Can you give me the name of the officer?—I do not remember the name.

- 35,836. Can you let us have that and also other particulars?—Yes.
- 35,837. Can you give us the name of the dispensary?—There is only one at Gorakhpur. I will send you the full particulars later.*
- 35,838. In answer to our Question 17, Agricultural Industries, you say that the men would not touch eggs and fowls. Is that prejudice universal?—Yes.
- 35,839. You do not think there is any chance of any caste or class taking up poultry farming?—The *Chamar* classes may take it up.
- 35,840. In answer to our Question 18, Agricultural Labour, you say: "We want our surplus to be provided for elsewhere." That is to say, you want to import labour; is that the idea?—I want the Government to send the surplus labour that we have in Gorakhpur to Assam, where there is plenty of land.
- 35,841. You have surplus labour?—Yes.
- 35,842. Unemployed?—I do not know whether it is unemployed or not. These people come and work on the sugarcane field simply for the sake of the top of the cane.
- 35,843. For no wage at all?—No.
- 35,844. Do you happen to know whether there is recruiting for the Assam tea plantations?—I do not think they should go as labourers.
- 35,845. Your idea is that they should go somewhere and settle?—Yes.
- 35,846. *Sir Henry Lawrence*: As a matter of fact, do any men go to Assam and settle there?—No; I do not think so.
- 35,847. There is some emigration from the Gorakhpur district?—Yes.
- 35,848. That is the most extreme eastern district?—Yes.
- 35,849. It is the chief recruiting district for Assam?—Yes; but they go as coolies and come back again.
- 35,850. They do not take their families and settle there?—No; I have never heard of any going and settling there.
- 35,851. You think that is a good thing that they should be allowed to go there on wages?—I suggest that they should be given lands and made to settle there; it will be a more attractive thing.
- 35,852. There is no opposition that you know of from the landlords in your district to this emigration?—No; I do not think so.
- 35,853. There is no objection from any point of view?—I do not think the landlords will have any objection to that.
- 35,854. Have you heard of any objections put forward either in the Press or in public meetings or anything of that kind?—No, not at all.
- 35,855. We are told that objections have been put forward?—When these coolies go there under contracts, they are treated badly; but I have never come across any objections.
- 35,856. That contract system has now been abolished, has it not?—I do not know.
- 35,857. You state that they are still taken there on indenture?—One man complained to me the other day that his son had gone somewhere and he could get no trace of him. He took a loan from me and went in search of his son, but he has had to return without being able to find him. He applied to the Collector explaining the circumstances and asking that his son should be sent back to him.
- 35,858. But there is no indenture system in force now, is there?—I do not know.

* Not received.

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- 35,859. *Sir Ganga Ram*: You have got a sugar factory?—My father has.
- 35,860. And you grow sugarcane? Do you make sugar direct from the cane or from *gur*?—From both.
- 35,861. That is to say, when the cane season is over you make your sugar from *gur*?—Yes.
- 35,862. And you have found Co. 213 quite satisfactory?—Yes.
- 35,863. I suppose you keep your own seed and do not have to import from Coimbatore?—No.
- 35,864. Do you find that there is any deterioration in the germinating power of your own seed?—During the last five years I have noticed no such deterioration.
- 35,865. Do you not require occasionally to import seed from Coimbatore?—I cannot speak about the future, but up to now we have not imported any, except, of course, the quantity which was imported at the very beginning.
- 35,866. *Sir Henry Lawrence*: That was five years ago?—Yes, about six years ago.
- 35,867. *Sir Ganga Ram*: And what are the varieties which are recommended by the Agricultural Department? From the evidence before us Co. 213 did not seem to be much in favour? Have you tested any of their varieties?—This variety was the one recommended by the Agricultural Department.
- 35,868. Barring that, have you tried any other variety?—Yes, 247 Java. We have also tried 48 Shahjahanpur and we have tried Barbados.
- 35,869. And the Shahjahanpur quality is not as good as this one, is it?—It is very good cane, but on my farm it did not do well.
- 35,870. Is that a soft cane?—Yes, but it has the habit of lodging, with the result that jackals and wild boar chew it up and destroy it. But Co. 213 does not lodge, and it keeps on for a long time; that is to say, we can crush it in May even without fear of deterioration in purity setting in.
- 35,871. But what about the softness which enables people to chew it easily?—It is not soft; it is a bit hard.
- 35,872. Is Shahjahanpur soft?—Yes.
- 35,873. So that it is not popular with the people because they would find it difficult to chew?—We do not want them to chew our cane, and so we prefer it to be hard.
- 35,874. You have experience of tube-wells?—Yes.
- 35,875. As distinct from bored wells? Which is the one with which you are familiar?—We have got a tube well 260 feet deep with a strainer from the top.
- 35,876. Have you any experience of bored wells?—Yes, that is also doing very well.
- 35,877. Have you any on your farm?—We tried one well some time back and the result was that we obtained a better supply than before.
- 35,878. In these tube wells, whose strainer do you put in generally?—The agricultural people do it for me.
- 35,879. And they give you very easy terms, Government charging some subsidy?—No subsidy is charged. We have to pay for all the labour ourselves.
- 35,880. Government does not bear any share of the cost?—Perhaps an Engineer is supplied free and probably also tools for boring; nothing else.

35,881. What assistance does Government render in the boring of wells?
—We have to pay for all the boring work.

35,882. It is said that if there is a failure, Government stands the loss? Is that true?—I think we have finished four or five tube-wells, of which two were just started with an ordinary oil engine. The scheme is to work all these tube-wells by electricity, and there has been no failure up to now, so I cannot say whether Government will bear the loss in case of failure.

35,883. You get sufficient assistance from Government in regard to advances of money for industrial purposes?—For boring work the Government gives advances.

35,884. Do you get anything for the machinery?—Not for purchasing machinery.

35,885. *Sir Thomas Middleton*: With regard to the question about the fragmentation of holdings, you said in answer to the question whether any more addition to the law was necessary, that the present law is more than sufficient? What do you mean by more than sufficient?—In former days when there was no tendency law the zamindars and tenants lived on very happy and amicable terms. The landlords loved their tenants and the tenants in their turn loved their landlords.

35,886. *The Chairman*: When was this?—When there was no law.

35,887. *Sir Thomas Middleton*: Before there was any law on the point, would the landowner have seen to it that the land was not divided?—There was no possible chance of any division. Whenever the landlord thought the land was being subdivided he simply put a stop to it by ordering the people to go elsewhere. Now that there is this law the zamindar and the tenant are constantly wrangling, the former trying to prevent the latter from becoming an occupancy tenant and the latter trying to become one. This is one of the reasons why holdings are subdivided. If a man has a holding of, say, five acres of land as occupancy holding, and he has five sons, each son wishes to live on his little bit of land and that is how the land is being subdivided.

35,888. In answer to Question 12, you say that there is no chance of improving agriculture unless the plough cattle can be improved?—That is the first thing to be improved because when you have got good cattle the people take milk. When the people take milk they are much stronger in health than they would be otherwise. What do we see in the Gorakhpur district? There you would require ten coolies to do a piece of work whereas it would require only one or two Punjab coolies to do the same piece of work. When they take milk they will naturally become stronger and besides they will have better cattle to plough their land with, and apart from all that, they will have manure for their fields.

35,889. *Sir Thomas Middleton*: If you had an improved breed of cattle would you be able to feed and keep them in good order?—Yes, when we can feed a bad breed I do not see why we cannot feed a better breed.

35,890. But the big breed wants more food than the smaller breed?—No; the Montgomery cows do not want much food.

35,891. You say there are no pastures in your district of Gorakhpur. How do you feed the cattle that you have?—The people go about in the villages and find some green grass which they cut and bring home to feed their cattle.

35,892. But there must be pasture land if there is fine green grass?—No pasture land; the grass is found on the borders of the fields.

35,893. How much land did you say you had?—Ten thousand acres.

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35,894. Would it be a practicable thing to convert any of that into pasture land?—Government, I think, should take the lead first instead of asking the zamindar to do so.

35,895. But the zamindar knows what is wrong and he should show the way to improve?—Government has got more land than the zamindar. There are vast areas of forest land, and Government can well spare a portion of that forest land for breeding purpose.

35,896. How many acres would one pair of your plough bullocks cultivate in your district?—We have got a mixture of both plough as well as tractor cultivation.

35,897. If you take the best of your plough bullocks, what area would you cultivate with a pair of bullocks?—One pair of plough bullocks would be quite sufficient for seven acres.

35,898. If you take these country bullocks that you have been criticising, how much do you think they would be fit for?—I have not made any calculation about that. They can only do light ploughing.

35,899. They would do the same area but they would not do as well as your bullocks? They would plough ten acres but they would not do it properly?—Not even that. I do not think they can do the same amount of work that a better breed of bullock can do.

35,900. What I was trying to get at was whether your improved bullocks were cultivating more land and cultivating it better than the others?—Yes, that is the case. Judging from the load which the ordinary bullocks carry, I find that the ordinary bullocks carry a cartload of 15 maunds of sugarcane as compared to a cartload of 30 or 40 maunds which the better type of bullocks carry.

35,901. You say somewhere that you suffer from a deluge of inferior Brahmini bulls?—Yes.

35,902. What is there to prevent these bulls being castrated?—They are Brahmini bulls and cannot be castrated.

35,903. I was told by a witness yesterday that there were a number of inferior bulls in his district and there would be no difficulty in castrating them?

35,904. *The Chairman*: Not Brahmini bulls, I think?—You cannot castrate Brahmini bulls.

35,905. *Sir Thomas Middleton*: Have you any suggestions for dealing with this deluge?—I think the best thing would be for those people who want to have these Brahmini bulls, to collect some money, say, Rs.200 and to get a good breed of bull, instead of going in as they do now for these ordinary inferior bulls.

35,906. *Raja Sir Rampal Singh*: Are there facilities for zamindars to expand their farms or to start new farms under the law?—I think there is no possible chance for the zamindars to start farms.

35,907. Do you think that, taking all the circumstances of the Provinces into consideration, the zamindars are better equipped to start farming on improved lines than others?—They can do much better work, certainly. But now the attention of the zamindar is probably drawn towards that, because everything else has gone. The difficulty however would be perhaps that the zamindars would not get sufficient land to cultivate, themselves, under this new law.

35,908. In the tenancy law there is a provision?—Yes, but I wonder if that provision can be brought into action.

35,909. Because it will be too expensive for the zamindars to take that land? There is a provision that if any zamindar pays four times the rent

of a holding, he can acquire it?—You can never get it. It is only in the law, but you will never perhaps get it.

35,910. Because the Collectors stand in the way?—Always. It all depends upon what sort of man the Collector is; it depends on his will. If he thinks that the zamindar can do the work, he will give sanction, but in the majority of cases it will never be sanctioned.

35,911. As long as we do not get good bulls of good breed, do you not think that the present custom should be allowed to be continued? For improving the breed of the cattle, it is not possible for every village to get one bull from outside for Rs.200 or Rs.300?—It is not very difficult. I have not calculated the figures, but I think in each village four or five bulls every year must be let loose. In the Gorakhpur district the villages are small, perhaps hardly 1½ miles apart.

35,912. Do you know how many villages there are in Gorakhpur?—No, not in Gorakhpur, but I know my own villages.

35,913. Every village will require four or five bulls?—They do not require so many bulls, but it is the custom that they follow.

35,914. One bull will be quite enough for a village?—Yes, quite enough.

35,915. One bull will be enough to cover the cows in the village?—I think so.

35,916. *The Raja of Parlakimedi*: On your farm, what sort of labourers do you engage? Are they all paid labourers?—There are paid labourers as well as people who live round about in our own villages. They have got land. One member of the family looks after the land, but the others come to the farms in the neighbourhood.

35,917. Are they all like that?—No; they are mostly paid labourers.

35,918. How many permanent hands do you have? You must reduce or increase the numbers according to the requirements of the season?—Yes.

35,919. Throughout the year do you not maintain a certain number of permanent servants?—We have arranged that they should always work for the people throughout the year. If they are working on sugarcane at one time, at other times they must be doing some other work. Once a man goes away, you will never get him back, and we lose the money spent in teaching and training him.

35,920. Are they fully occupied throughout the year?—Practically for the whole year.

35,921. During the slack hours, have you introduced any home industries, like rope-twisting, to keep them engaged?—I have not introduced rope-twisting, but we have got a sugar factory, and that and the farm are joined together.

35,922. For their requirements, do you lend money also?—Yes.

35,923. Do you advance it on their pay?—I advance money.

35,924. In what proportion?—It all depends upon the necessities of the man; one has to judge.

35,925. If a labourer of yours was drawing Rs.20, how much would you advance him?—Advance for a month or advance for the year?

35,926. How much would you advance him as a lump sum?—Rs.10 or Rs.15; that has to be given to him in the very beginning of the season.

35,927. You pay in advance?—Yes. He goes on drawing up to half his pay. If he wants any advance, he can draw up to half his wages, and at the end of the season he has to clear up the whole account.

Sardar Kirpal Singh.

35,928. Apart from that, do you advance any money for marriages and other requirements?—He sometimes comes and asks for money for a marriage; sometimes he says he wants money for purchasing bulls or calves.

35,929. Or to repair his house?—Yes, all sorts of things.

35,930. What is the rate of interest you charge?—It is 9 or 10 per cent.

35,931. In what instalments do you recover it?—If the crop is good, he pays back. It is only very few who do not pay back; most of the people pay back themselves.

35,932. You do not press for payment very often?—No; they pay back.

35,933. Have you not found any difficulty in recovering?—Not much. There are a few who will take the money and go away, and you will never see them again, but the majority are not like that.

35,934. In your sugarcane cultivation, are you carrying on the ratoon system of cultivation?—Yes.

35,935. To what extent?—One year only.

35,936. What is your present area under cane?—Just now it must be something like 200 to 300 acres.

35,937. Is it all irrigated?—Mostly irrigated.

35,938. Do you irrigate by tube-wells?—By tube-wells and pumps.

35,939. As regards the outturn of *gur* and sugar, which pays better, the irrigated or the unirrigated?—I have not calculated it separately; we do not get any chance of testing, separately, irrigated and unirrigated canes, as they all come along at one time.

35,940. You manufacture sugar also?—Yes.

35,941. What is your outturn per year?—It all depends on the crop, how much you crush.

35,942. You have been carrying on this industry for some time. What will it be on an average?—About 80,000 maunds of sugar.

35,943. What is the capacity of the mill?—400 to 600 tons of cane per day.

35,944. Have you been able to work it to its maximum capacity?—We have crushed 400 tons per day.

35,945. What sort of sugar do you produce?—It is white sugar.

35,946. It is bleached white?—Yes, it is absolutely white.

35,947. What methods of bleaching do you adopt?—We have got our own process.

35,948. I do not want to get at your secrets?—There is no secret at all. The process has been patented.

35,949. There is no difficulty in marketing that variety?—No, none at all.

35,950. Do you make most of your sugar in bleached form?—There are two qualities, No. 1 and No. 2; No. 1 is absolutely white; No. 2 is slightly yellow.

35,951. How much of each do you produce?—It is in the proportion of 2 to 1; two of No. 1 quality and one of No. 2 quality.

35,952. Which has the better market?—Both have a good market.

35,953. Do you have to sell it at a long distance from your place, or can you sell it near by?—There is no consumption near by. I have to send it all along to this side.

35,954. Is it in crystallised form?—It is both powder and crystals. It depends on the market. Some people require crushed sugar and some people require crystal sugar. We supply what they want.

35,955. Have you been experimenting upon the effects of manure on sugar?—Not much.

35,956. Do you simply use the farmyard manure?—Yes.

35,957. *Sir James MacKenna*: You are both a farmer and a sugar manufacturer. Have you had any agricultural training?—No, I have had no agricultural training.

35,958. Except what you learnt?—I think zamindars are born agriculturists.

35,959. Have you had any engineering training?—None.

35,960. You picked that up too?—My brother picked it up.

35,961. He is an engineer?—Yes.

35,962. Does he do the engineering of the sugar factory?—Yes.

35,963. How long have you had this factory?—When you were on the Sugar Committee you must have seen it; it was a very small thing at that time. My father started it in 1913 or 1914.

35,964. How many days in the year do you work the sugar factory?—On the average 90 to 100 days.

35,965. That is with cane and with *gur*?—Not with *gur*; it is only for the cane.

35,966. You get 100 days' cane crushing?—Yes.

35,967. Where does the cane come from, apart from your own?—It comes from many places near by.

35,968. Does it come up on the railway?—Not much.

35,969. All from round about, and carted in perhaps?—Yes.

35,970. What rate are you paying this year for cane?—Seven annas.

35,971. Is the factory paying?—It is paying.

35,972. What allowance do you make for depreciation? Do you strike an annual balance sheet for the factory alone?—We allow depreciation, but accounts are amalgamated with estate accounts and no separate balance sheet is prepared.

35,973. With the general revenues?—It has been like that.

35,974. *The Raja of Parlakimedi*: You do not work it separately?—No.

35,975. *Sir James MacKenna*: You do not keep a separate account?—There is a separate account, but we do not work it separately.

35,976. It goes into the general revenues?—Yes.

35,977. I suppose you do make an allowance for depreciation?—Yes, 7 per cent.

35,978. *Professor Gangulee*: Are the small cultivators in your neighbourhood growing sugarcane?—Yes.

35,979. And you buy their sugarcane?—Yes.

35,980. What varieties are they growing?—Now they are all taking to Co. 213.

35,981. Are the small cultivators taking to Co. 213?—Yes.

35,982. Do they get the seed from you or from the Department?—They get the seed from me.

35,983. You talk about the use of chemical fertilisers. Have you yourself been using any?—We have tried a little bit of it on our farm, but we did not like it.

35,984. What chemical fertiliser did you try?—Ammonium phosphate, ammonium nitrate and ammonium sulphate.

Sardar Kirpal Singh.

- 35,985. You had no success?—We did not notice any.
- 35,986. I understand that Gorakhpur is a big recruiting centre for labour for the Assam tea gardens. Do many coolies come back and settle down in Gorakhpur?—Some who have some interest here come back and some who get a holding there do not come back.
- 35,987. Some of them do come back?—Some do come back, some do not.
- 35,988. How do they engage themselves after their return?—They come back, and they go about working in other factories and in their own holdings. Some of them have got their own land. They probably learn something while in the tea gardens, and they do something when they come back.
- 35,989. Do you know any labourers who have come back from Assam?—There are many people in my own place. Some of them have come back even from Cuba.
- 35,990. Do you find any change in the standard of living of the man who has come back from Assam?—No.
- 35,991. How many sugar factories are there in the United Provinces?—Do you mean for sugar or for *gur*?
- 35,992. To get sugar from cane?—There is one at Rosa, there is another at Tamkoi, then our own, Gaghauli, Padraunalia, Partabgarh and Pilibhit.
- 35,993. In all about six or seven?—Yes.
- 35,994. Of these how many are run by the zamindars?—Three.
- 35,995. Three are owned by the zamindar class?—Yes.
- 35,996. Do you think there is more scope for sugar manufacture in the United Provinces?—I think so.
- 35,997. Why do not the zamindar class as a class come forward?—I think they are coming forward. First of all, the impression was that Indians could not work a sugar factory. It was thought it was a very complicated thing. Now that some zamindars have started the others think: "They are just the same as we are. If they can work it, why cannot we?" We started our factory first, and, seeing us, Padraunalia started.
- 35,998. So that shows that once the lead is given the zamindar class can take up on a large scale industries like sugar manufacture?—Yes.
- 35,999. Is there a tendency among the zamindars to use improved methods of cultivation and implements and machinery?—I think a number of the zamindars have started using them.
- 36,000. How many tractors have you seen on the zamindars' own farms?—We are doing our work with tractors.
- 36,001. Any others?—No others in Gorakhpur up till now.
- 36,002. What other improved methods have you observed that the zamindars follow?—You mean in cultivation?
- 36,003. Yes, cultivation and other things?—They have taken up this sugar cultivation, they are using improved varieties of wheat, they are putting in tube wells, and so on.
- 36,004. That is done even by the smaller proprietors? I mean something which the smaller proprietor does not do and cannot do, but which the zamindar is doing?—You can take our own example.
- 36,005. Is there no distinctive tendency to adopt new and improved methods by the bigger zamindars?—I think there is. The zamindars are waking up. Every week two or three inquiries come to me as to what we are doing, and how they should start.
- 36,006. So that you think the outlook is hopeful, so far as the zamindar class is concerned?—Improved methods are being followed, but the difficulty is to get the land.

36,007. Is there a difficulty about land, or is it the difficulty of private enterprise?—I think the difficulty is about getting land.

36,008. Do you think the zamindar class is kept back by the difficulty of getting land and not by its conservative mentality?—No, not by the latter. They have been doing very good work. They simply wait to see the result of what the others do. Once a zamindar starts something, all the other zamindars will take it up.

36,009. *Sir Ganga Ram*: What is the duty against Java sugar?—It is 15 per cent.

36,010. With that advantage how is it that you cannot compete with Java?—The reason is that sugar is being smuggled into India a good deal. It is coming in by smuggling and is being sold at a much lower rate than the Calcutta or Bombay people can sell.

36,011. But still you cannot compete with Java sugar with all the facilities at your disposal?—When land is given to the factories then they will be able to compete with any outside industry. When you have got your own land and cultivate it yourself and get absolutely fresh cane from your own fields, then you can compete with outside industry. At present we have to buy our stuff and rail it from distant places. The quickest you can crush with outside cane is five or six days, and it deteriorates a great deal.

36,012. How do you clarify your sugarcane? Do you use bone charcoal?—No. We use lime and sulphur.

36,013. Does not the Cawnpore sugar factory use it?—No, it is a *gur* factory.

36,014. But it has to be clarified just the same?—They use lime for clarifying.

36,015. *Sir Thomas Middleton*: What is the average yield of sugarcane from your land?—Last year, on the average, we got 936 maunds per acre. Mr. Clarke sent me a man to cut a portion, which gave a figure of 1,146 per acre.

36,016. What area have you under sugarcane this year?—About 300 acres.

36,017. And you are getting that yield from 300 acres?—Last year it was about 200 acres and that was the average from sown cane. The ratoon crop gave us on the average 600 maunds per acre. This year's result is yet to be seen.

36,018. *Sir Henry Lawrence*: How much of that is Coimbatore 213?—The whole of it.

(The witness withdrew.)

The Honourable Mr. SHYAM BIHARI MISRA, Member, Council of State and Registrar, Co-operative Societies (on leave), Lucknow.

Replies to the Questionnaire.

QUESTION 2.—*Agricultural Education*.—(i) No; teachers of agriculture should be provided in all rural schools as far as possible, and certainly in all vernacular middle schools, as well as in those Anglo-vernacular schools where a demand may be found to exist. I think there should be very little literary instruction in rural schools beyond the three R's; agricultural training should predominate there, together with industrial training also.

(ii) This should be done throughout the Province, specially in rural areas.

(iii) At least a sufficient number of lessons on agriculture and co-operation should be inserted in the textbooks of all vernacular schools and up

to class VIII of Anglo-vernacular schools. Also a special class on agriculture should be added to each vernacular middle school.

(x) By giving facilities for starting big farms by youths trained in agriculture, and financing the running of such farms at very low rates of interest (say 4 per cent. for the first five years, 5 per cent. during the next quinquennium, and then 6 per cent. so long as necessary). The security demanded should not be strict. I am sure the adoption of this course will perceptibly reduce unemployment and discontent among the educated middle classes.

(xii) By providing free night schools, part-time schools and off-season schools. The part-time schools should work in the forenoon as well as in the afternoon, but different sets of students should attend them on the two occasions.

(xiii) The administration may vest in Local Boards (District or Municipal), but Government should finance the scheme by levying an education cess and supplementing it by a 50 per cent. contribution from the public exchequer.

QUESTION 3.—DEMONSTRATION AND PROPAGANDA.—(a) Purely demonstration farms alone can be, and have to some extent been, successful, if run as business concerns on self-supporting lines. I fear many people doubt the truth of the claim of financial success of our demonstration farms. If the claim is really correct, as I expect it must be, there should be nothing to prevent an indefinite and extensive multiplication of such farms as early as practicable, till each village can boast of such a farm. We should begin by starting one such farm at the headquarters of each district, tahsil, *pargana*, and at each *thana*, vernacular school and agricultural co-operative primary society. The development of sugarcane cultivation in the Hardoi district is said to be mainly due to this source.

(b) Cultivators selected for the purpose should be trained at these farms on payment of moderate wages to them, say Rs.5 per month each, while every one interested in agriculture should have free and easy access to the farms so as to profit by their working.

(c) Cultivators, and others interested in agriculture should be given the fullest facilities to study the working of demonstration farms actually run at a profit.

QUESTION 4.—ADMINISTRATION.—(a) The Government of India may issue a series of agricultural primers and readers incorporating all useful information about improved agriculture, and also an All-India Agricultural Journal dealing with up-to-date inventions and discoveries which tend to improve and develop agriculture. All these may be issued in English, while Local Governments may issue their translations in the principal vernaculars of their own Province.

QUESTION 5.—FINANCE.—(a) The multiplication of promising co-operative societies and the formation of at least a few land mortgage banks. Steps should also be taken to reduce the rates of interest on which co-operative societies can advance loans to their members; the present rates (12 to 15 per cent.) are too high and they may reasonably go down to, say, 9 per cent. per annum, by Government taking upon themselves the responsibility of incurring all cost on co-operative education and supervision, and distributing *taccavi* through co-operative societies.

(b) *Taccavi* should be distributed freely through co-operative societies (primary), steps being taken to see that the money reaches individual members at not more than 1 or 1½ per cent. over and above the rate of interest charged by Government from the societies. There is no need to bring the Central Banks at all into his scheme.

QUESTION 6.—AGRICULTURAL INDEBTEDNESS.—(a) (i) The precariousness of the harvest, and the poverty and improvidence of the ryot.

(ii) Mostly the *mahajan* (village moneylender) and to some extent other sources (as co-operative societies, *taccavi*, etc.).

(iii) Bad harvests, inefficiency and improvidence of the cultivators; also their innate habit of unpunctuality and a desire to postpone payment as much as possible.

(b) All the recommendations made throughout my note are of course intended to serve the purpose of lightening the agriculturists' burden of debt and to improve their general condition. I am not in favour of rigidity in enforcing such laws as the Usurious Loans Act, the Insolvency Act, and those limiting the right of mortgage, sale, etc., as they often tend to defeat their own purpose and unduly restrict the credit of those concerned and even the value of their property, but interest at a rate of over double the rates at which co-operative societies advance loans to individual members may well be declared usurious and be discouraged. The development of promising co-operative societies should be encouraged, in spite of the unnecessarily sweeping condemnation of the movement in the United Provinces by the Oakden Committee* of which I was a member. Paragraph 9 of the Committee's Report is worthy of consideration.

(c) *Vide* the above reply under (b) The Dewan of an Indian State told me that he had practically to guarantee *mahajani* loans in a *pargana* of the State, as he found that cultivation was likely to be seriously crippled if the *mahajans* were to withhold loans.

QUESTION 7.—FRAGMENTATION OF HOLDINGS.—(a) Consolidation of holdings, as far as found practicable in different areas, appears to be the only remedy. I enclose a copy of my own "Report on the Consolidation of Agricultural Holdings,"† with the United Provinces Government's Resolution‡ dated 27th May, 1924, thereon for the Commission's consideration; I venture to invite their special attention to paragraphs 1, 2, 3, 5, 7, 8, 9, 10, 11, 12, 13, 14, 16, 17, 18, 19, 20, 21, 22, 23, 34, 35 and 36 of the Report.

(b) Incompact partitions of zamindari rights constitute the chief obstacle. There are also other difficulties as detailed in my aforesaid Report‡ (copy enclosed), such as succession, alienation of landed interest, separation of joint families, sub-letting, ejection and the like (see paragraphs 17 to 20 of my Report).

(c) I can only refer the Commissioners to my Report referred to above.

QUESTION 9.—SOILS.—(a) (i), (ii) and (iii).—Government should take steps to reclaim and improve soils and waste lands, where practicable, provided the landlords concerned agree to pay 50 per cent. of the cost, at least in cases of success. Enhanced revenue will enable the Government to recoup its expenses in due course.

(c) As above. It may also be perfectly feasible to remit land revenue, wholly or partially, for a number of years.

QUESTION 10.—FERTILISERS.—(a) I think natural manures have a greater chance of being generally resorted to at present, but artificial fertilisers should by no means be neglected. Re-forestation should be encouraged, in the interest alike of meteorological conditions and of providing fuel in order to prevent the extensive use of cowdung as fuel and to facilitate its use as a fertiliser. The export of bones should be prohibited, and steps should be taken to popularise the use of bone manure.

(c) New and improved fertilisers should be made easily available to villagers

(f) See my answer to (a) above.

* Report of the Co-operative Committee of the United Provinces of Agra and Oudh, 1926.

† Not printed.

QUESTION 11.—CROPS.—(a) (iii) Improved seeds should be made more easily available to villagers and the punctuality of supplies guaranteed.

(iv) Licences to possess guns for agricultural purposes should be given for the mere asking, provided the demand is genuine and the applicant bears a good character.

QUESTION 14.—IMPLEMENTS.—(b) Improved agricultural implements should be used in demonstration farms and they should be made easily available to those requiring them. They should not be very costly or very complicated, and they must be locally repairable.

QUESTION 17.—AGRICULTURAL INDUSTRIES.—(a) The average cultivator works on his holding from July to December and from the middle of March to the end of May, i.e., for nearly 8½ months every year. In the slack season, some work as labourers, others ply bullock carts or ponies, yet others make ropes, etc., while the rest are either idle or do other work.

(b) It is very necessary to help the introduction of as many cottage industries in each locality as possible, such as spinning, weaving, fruit growing, starting small factories (for hulling rice, extracting oil, etc.); demonstrations may be given at suitable centres to enable the villagers to imitate them. Serious efforts should be made to relieve the present excessive pressure on land.

(c) Ignorance and orthodoxy stand in the way of the adoption of several industries. Supply of information and demonstration of the utility of such industries would remove the obstacles in their way.

(d) Certainly; very little is possible without giving demonstrations of the success of anything new.

(g) *Vide* (a) and (b) above.

QUESTION 19.—FORESTS.—(b) Re-forestation, as suggested under Question 10 (a) would automatically improve the supply of firewood as well as fodder in rural areas and elsewhere. The growing of suitable fodder crops should also be demonstrated on the Government farms.

QUESTION 20.—MARKETING.—Most of the agricultural produce passes from the producer to the consumer through several middlemen including the village *bania*, the transport agent, the city broker, in many cases another set of transport agents and a second set of village *banias* in the country or the big exporter who exports overseas. Co-operation, when adequately developed, should help the grower to eliminate most, if not at all, of the middlemen.

QUESTION 22.—CO-OPERATION.—(a) (i) Government may reasonably be expected to undertake most, if not all of the expenses connected with supervision and co-operative education.

(ii) Non-officials should help their lower class and humble brethren in making primary societies, which really constitute the backbone of co-operation, living organisms standing on their own legs as early as possible. Slight temptations of petty power and patronage should not make them callous to the pressing requirements of the dumb, ignorant and toiling millions of their unfortunate brethren whose vital interests the co-operative movement is intended to serve. I consider it essential that the powers of central societies, which are at present absolutely excessive, should be reduced to the barest necessity, and those of the primary societies should be increased proportionately, steps being simultaneously taken to ensure regular repayment of the former's dues by the latter, with the utmost possible punctuality. In particular, the executive services (such as supervisors, organisers and group secretaries) should be totally detached from central societies. The cadre of supervisors and organisers should be provincialised under a provincial co-operative committee, and group secretaries, where they cannot be done away with and replaced by local secre-

taries, should be made real servants of the primary societies which should pay their quota of the secretaries' salaries direct to them.

Detailed recommendations will be found in the Oakden Committee's Report (published by the United Provinces Government), with which I generally agree, except that I consider several remarks and suggestions therein not only much exaggerated but actually wrong.

(b) *Vide* (a) (ii) above.

(c) Not at present; I agree with Mr. Kharegat's note on the subject, already submitted to the Commissioners, but in cases of serious importance only.

(d) Not to a satisfactory extent, but please see paragraph 9 of the Oakden Committee's Report referred to under (a) above.

QUESTION 23.—GENERAL EDUCATION.—(a) Elementary education must increase considerably in order to make our masses better agriculturists. Serious efforts should be made to raise the ratio of literate people to a respectable figure, say 90 per cent. of males and about 75 per cent. of the total population in the near future. Then and then only can there be a real improvement in agriculture as well as co-operation, the greatest handmaid of agriculture. An increase in higher education is also desirable from the agricultural point of view as well, but it is not so essential.

(b) (i) Please see my answer to Question 2 (1). Also, elementary education should be declared free and compulsory, perhaps for the male children only at present, in as many districts as possible.

(ii) Compulsory education has not made any perceptible headway in rural areas so far, and indeed there is a strong dislike of and even opposition to it in many places, but I am deliberately of the opinion that it is bound to succeed in due course, much earlier than many people imagine, if carried on with zeal and determination.

(iii) The explanation will be found in the poverty and ignorance of the masses.

QUESTION 24.—ATTRACTING CAPITAL.—(a) Multiply indefinitely the number of self-supporting demonstration farms, giving facilities of learning practical agriculture there to all interested in it, and facilitate the starting and maintenance of big farms of say 50 to 100 acres and even more. Also, encourage the ready availability of easily manageable and locally repairable but improved implements of husbandry which, however, must not be very costly or complicated. The adoption of these and similar measures to encourage attractive agriculture and industries would reduce unemployment among the educated middle classes perceptibly, and also wean impatient idealists from violent politics and terrorist tendencies.

(b) The greatest factor is the fear of early enhancement of land revenue.

QUESTION 25.—WELFARE OF RURAL POPULATION.—(a) A fixed proportion of the land revenue and income tax raised from each village, say 10 per cent., may be set apart and ear-marked for effecting hygienic, educational, agricultural and general improvements, to be effected in the village concerned through the agency of the village panchayat under the supervision of the District Board. This allotment must, of course, be over and above the ordinary expenditure at present incurred on these objects by the Government or any local authority.

I am also of the opinion that a Development Board should be constituted in every Province, to co-ordinate the activities of the nation-building departments, such as Education, Agriculture, Industries, Co-operation and Sanitation. It should be presided over by a Minister and consist of heads of the departments concerned, with other officials and non-officials as members; it should meet at least twice every year.

The Hon. Mr. Shyam Bihari Misra.

(b) I am not in favour of conducting any economic surveys, etc., as they are likely to prove costly and more or less valueless luxuries; the facts ascertained are also not likely to be accurate.

(c) I did carry out some inquiries in this line during the course of my special duty on consolidation of agricultural holdings in 1921-22. The broad conclusion reached by me was that economic conditions were slightly improving gradually though the masses even now live almost from hand to mouth. Also, I do not consider agricultural indebtedness to be excessive, but it is certainly considerable and weighs heavily on say 25 per cent. of the rural population.

Oral Evidence.

36,019. *The Chairman*: Mr. Misra, are you a member of the Council of State?—Yes.

36,020. And you are Registrar of Co-operative Societies?—Yes, but I am on leave at present.

36,021. Are you still Registrar of Co-operative Societies?—I am, technically. I have not been reverted.

36,022. I think your successor has only recently taken over responsibility?—He took over only two months ago.

36,023. And it was for this reason that it was thought better that you should represent the Department's views?—Government asked me to appear.

36,024. We have your note of the evidence. Is there anything you would like to add to that?—Nothing; whatever views I wish to place before this Commission are in my note. I have nothing to add to it.

36,025. We are obliged to you for the trouble you have taken, and I will examine you on those notes and on some of the statements presented to the Commission in Chapter XVI of the Report on Agriculture in the United Provinces. For how long were you Registrar?—For just over two years, and before that I was Deputy Registrar for two years, so that I have put in four years and two or three months in the Co-operative Department.

36,026. Have you read chapter XVI? Did you prepare it?—I sent in a note, and I expect it has been prepared in the Secretariat from that.

36,027. Do you regard the movement in this Province as being in a healthy condition?—It is not as good yet as should be expected, but I do not consider it is so bad as it has been assumed to be in some quarters.

36,028. I want to get at the facts about your central credit associations. Have you any Provincial or Apex Bank?—None.

36,029. How many district banks have you got?—36, I think. We have 28 central banks, eight banking unions, two guaranteeing unions, and two non-credit central societies.

36,030. I understand that the difference between your District Banks and your Central Banks is rather difficult to define?—The District Bank is a Central Bank at the headquarters of a district. Their functions are the same, except that some of the smaller Central Banks are affiliated to the District Banks, but the others are quite independent.

36,031. Their function is the same?—Yes, exactly the same, except that some of the smaller ones, as I say, are attached to the District Banks.

36,032. From where do these District and Central Banks derive their capital?—Mostly from shares and deposits.

36,033. Have they issued any mortgages?—No, simply preference shares and ordinary shares.

36,034. Have they issued any debentures, secured on mortgages, I mean?—One or two banks have, I think, but very few of them on the whole.

36,035. Then your Banking Unions differ from the District and Central Banks in that they have no individual members?—They have no individual members, but only society members.

36,036. How do they get their capital?—From the share-money of societies and deposits of the public. Their reserve is gradually increasing also.

36,037. Have the Central Banks or the Banking Unions borrowed money from any other banking concern?—Many of them have. They borrow from joint stock banks, and also there is inter-lending among the various Central and District Banks.

36,038. Can you tell me whether the Report of the Oakden Committee provides information as to the extent to which your Central Banks and Banking Unions have borrowed from Central and other banks?—I do not think it gives all the facts. It only suggested what appeared to it to be improvements.

36,039. Are you sure that these facts are fully known in your office?—I have given almost all of them in my annual report.

36,040. You think that is complete in that respect?—Yes.

36,041. Then I will not question you further about it, if the facts are available?—They are.

36,042. Now the Report on Agriculture in the United Provinces (para. 365) tells us that it is the duty of the Central Banks that we have been discussing to organise and supervise the primary societies as well as to finance them?—It seems to me that they have not been discharging the first two of these duties properly.

36,043. The Report tells us that it is the duty of these central credit societies to organise and supervise the primary societies as well as to finance them, but they have not discharged this duty adequately. First, on the point of principle, do you think it is a sound principle that your Central Banks should be expected to manage your primary societies?—I entirely disagree; I think they should not.

36,044. Would you agree that the usefulness and health of the movement depend more upon the primary society and the capacity of the members to understand, if not to manage, their own affairs, than anything else?—Yes, I think the primary societies are the real co-operative societies; I regard the Central Banks as being more or less what are known as middlemen; they should be nothing but financing bodies; they should have nothing to do with control, organisation or supervision.

36,045. *Professor Gangulee*: That is to say, all executive services should be completely detached from the central institutions?—Yes, that is what was recommended in the Report of the Oakden Committee, and I entirely agree.

36,046. *The Chairman*: What about the disposition of liquid resources at the disposal of the movement? Has that been concentrated in the Central Banks?—Yes, entirely.

36,047. Have primary societies kept any liquid resources in their own hands?—No, nothing whatever.

36,048. On the point of principle, do you think that is sound?—I think it is sound; I do not think it would be proper to keep the money actually in villages; it would not be safe; when it is idle it had better be kept in a safer place.

36,049. You would not like to see liquid assets of primary societies utilised to make further loans by those societies to their members?—No, I do not think so.

36,050. You follow what I mean?—Yes, I do. As a matter of fact, liquid assets are utilised by the Central Banks in this way: most of the liquid

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assets are invested in Government promissory notes, in cash certificates, deposited in some other safe bank or with an approved banker if considered quite safe and reliable; the return that they bring in is naturally small, but they remain liquid assets.

36,051. You do not think it would pay a primary society better to lend its liquid assets to its members than to transfer these to the Central Bank and borrow again?—No; the primary societies are not supposed to keep liquid assets, and they seldom do so; they only keep their reserve capital, and even that is not actually kept with the primary society itself; the money is usually kept by the Central Banks, mostly invested as stated, and I think that is a right practice.

36,052. Do you attach importance to the agricultural non-credit primary societies?—Yes, I do.

36,053. What work are they doing?—They are supplying improved seed, implements, &c., and some are stores; these are non-credit activities of the movement.

36,054. At the close of the year 1924-25 non-credit societies numbered six. One cattle breeding and two *ghi* societies had had to be closed in the preceding year because they were doing no work?—Yes.

36,055. The six societies comprised three dairies, one cattle insurance, one *ghi* and one agricultural supply?—Yes.

36,056. Then the report goes on to say: "but none of them, except one of the dairies, was doing any business, and it was considered not unlikely that five would soon have to be wound up"?—Yes, most non-credit societies are not doing well.

36,057. Is it the policy of the Government at the moment rather to concentrate on a revivifying of the credit movement than an extension of the non-credit societies?—I do not think so; I think it is the policy of Government to revivify anything that can be revivified with a fair prospect of success, but somehow non-credit societies are not flourishing in the Province.

36,058. You yourself point out in your note that the movement has rendered valuable service to the cultivators?—I certainly think so.

36,059. But unfortunately the figures of capital afforded have to be read in the light of the present position of the primary societies; I see that in 1924-25 134, and in 1923-24 135 societies were finally wound up?—Yes. It is our policy to wind up any societies which are proved to be inefficient or not working properly if they are also not expected to work properly; we do not want to keep societies merely for show.

36,060. And I see that pursuing that policy, no fewer than 794 societies were in course of liquidation at the close of 1924-25?—That is so.

36,061. Was that increase from 135 to 794 due to some particular action on your part as Registrar, or of your office?—No, it is not such a sudden increase; these figures are cumulative. It is not an increase from 135 to 794; they are accumulating gradually. In fact, the number of liquidated societies is gradually going down rather than up.

36,062. This had better be corrected if it is wrong. Will you look at page 78, paragraph 370, of the Report on Agriculture which I will read in full: "In 1924-25 134, and in 1923-24 135 societies were finally wound up." Are those figures correct?—Yes.

36,063. That is to say, 134 *plus* 135?—134 in one year and 135 in the other year.

36,064. "Besides this, no fewer than 794 societies were in course of liquidation at the close of 1924-25"?—Including those from previous years.

36,065. Apart from the 134 and the 135?—No; the total number in course of liquidation, now, at the end of 1925-26 is 826; liquidation proceedings with regard to some of them have been going on for 10, 12 and even 15 years, I am sorry to say; but the total cumulative balance is now 826.

36,066. We must be able to interpret the memorandum that has been provided for us accurately; can you or can you not tell me whether the 794 societies mentioned as being in course of liquidation at the close of 1924-25 are in addition to the 135 finally wound up in 1923-24 and the 134 in 1924-25?—I expect the figures must be right.

36,067. Then, would you let us know definitely, as representing your department before the Commission, whether that interpretation of those words is correct?—Yes.

36,068. Will you give the Commission an account of your methods of liquidation here? Who acts as liquidator?—An official or a non-official is appointed by the Registrar as liquidator; the Registrar has power to appoint anybody willing to work as liquidator, but it is usually either the Circle Officer or the paid manager of the bank.

36,069. Will you describe the functions of a Circle Officer in this Province so that we may understand?—The department consists of a Registrar, one Deputy Registrar, two Assistant Registrars and 27 Inspectors. These Inspectors perform various duties, but some of them are in charge of circles, and they are called Circle Officers; they are paid from Rs.140 to Rs.240 per month; they are in charge of from one to six districts at present. They generally act as liquidators, but if they have too much other work to do, we sometimes appoint the paid manager of the Central Bank concerned or some other official or non-official.

36,070. Do you ever appoint pleaders as liquidators?—Yes, we have done so; we may appoint anyone who is willing and whom the Registrar considers competent.

36,071. *Professor Gangulee*: How many Circle Officers have you?—At present we have 27 Inspectors; most of them are Circle Officers; two or three are not.

36,072. *The Chairman*: Now I want to draw your attention to paragraph 371 of the provincial memorandum, because it is necessary to have both sides of the picture on our notes. This follows on the paragraph dealing with the statement of the number of societies in liquidation, and it reads: "The above, however, is probably not all; there is only too good reason to believe that the spirit of many of these societies is wrong. It is of the essence of the movement that every member of a co-operative society should understand the principal canons of his creed. Technicalities he can dispense with, but the broad principles he must understand; only so will he be able to check the working of his society and to watch its direction by whatever managing committee is appointed. It is to be feared that but few members of the societies of this Province possess these qualifications. The average member is illiterate and totally unversed in co-operation lore; he understands by co-operation little more than a dignified form of lending and borrowing. He seldom takes interest in the administration of his society, which falls in consequence only too often into the hands of the permanent official or secretary, who alone understands it. That this description is not exaggerated can be seen clearly from the recent discoveries of corruption and neglect in several societies; when supervision of members is slack, management generally tends to become corrupt. Malpractices were found to have been committed again and again in the series of societies, 159 in all, which it has recently been necessary to liquidate in the Budaun district, and in others in Sultanpur and Benares, and more than one managing director

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has had to be prosecuted for dishonest practices. Such happenings point unmistakably to want of interest and lack of supervision on the part of members, amounting to a negation of the true spirit of co-operation. To quote the words of the committee referred to in section 374 below:— 'Judged by the conditions laid down by the Maclagan Committee, most of the primary societies of the Province are, as co-operative societies, a sham.' This conclusion may seem harsh, but its substantial truth can, unfortunately, not be gainsaid." Does that, in your view, represent a fair description of the movement?—In my opinion, this is a bit exaggerated. I do not claim that societies are generally in a good condition, but I certainly repudiate that they are merely a sham; I am not prepared to go so far as that. I have seen societies with my own eyes, and I have examined them. It is there that some members do know what co-operation is.

36,073. Would you kindly give the Commission an account of the method of audit?—We have now got here 52 Auditors.

36,074. All in one grade?—No; the grades are: Rs.50, 60, 75, 90 and 100. These Auditors are semi-Government servants. Government levies a contribution from the Central Banks and societies on the basis of their capital, and intends to contribute something itself; they are paid by the Government. They work under the Registrar and directly under the Circle Officers who check their work. The audit note is regularly sent to the Circle Officer, who goes through it very carefully and passes it on with his remarks to the Assistant Registrar. The Assistant Registrar, in special cases whenever he thinks it necessary, sends that note to the Registrar, otherwise he himself disposes of it.

36,075. Have you any superior inspectorate or any system of superior audit?—Formerly there was none; but now that system has been introduced and we have a larger staff now. The staff was most inadequate, but it has now been increased. The system of super-audit has been introduced by me recently after this increase.

36,076. Is it in operation?—It has just begun; we had 18 Auditors in 1924 and we have now 52 Auditors.

36,077. That is as regards the audit of the primary societies?—Primary societies as well as Central Banks.

36,078. It is pointed out in the memorandum, and you have agreed, that at present the Central Banks have been charged with the responsibility of management of primary societies. Now, what staff or machinery is available to the Central Banks?—The Central Banks have, generally, according to their size and the number of their affiliated societies, from one paid officer to four or five. Where there is only one he is the supervisor and also does the office work. Where the bank is big enough and has many societies affiliated to it, it has one paid manager and three or four supervisors. There is also one organiser if the organisation of many new societies is desirable; otherwise the supervisors do the work. Some of the banks have also a treasurer or cashier.

36,079. Can you tell us what happens in one of these primary societies when a member makes an application for loan? Would you describe the process of examination?—The member applies to his own society. Each member says that he wants so much. Then a meeting is held wherein it is decided how much is to be advanced to each member. Then they draw up a list of applicants and forward it to the Central Bank. The Central Bank scrutinises the list through its own supervisors. The Supervisor makes recommendations, and the Central Bank finally decides to whom, and how much, money is to be advanced. Now a recommendation has been made that this system should cease and the primary societies

should be given freedom to advance such loans themselves, the Central Bank advancing the money to the society as such.

36,080. How far has the scrutiny of the application by the primary society been a real thing and how far has it been a sham?—It depends on the worth of the society itself. Good societies do something; but I must say that the majority of them are bad at present. They are practically in the hands of a paid group secretary, an accountant who keeps the accounts of eight to twelve societies. He is supposed to be a servant of the society, but unfortunately he becomes their master.

36,081. Who appoints the group secretary?—He is now appointed by the Central Bank, but payment is made by the societies in the shape of contributions.

36,082. Is the statement of assets and liabilities of the applicant for loan available to the supervisor of the Central Bank?—Yes. It is known as the *haisiat* statement and shows what a man is worth. There is fixed what is known as the normal credit and maximum credit, and generally they give advances to the extent of the normal credit. If the man is a defaulter, no further advance is made to him; otherwise he is given up to the normal credit; but in special cases the Central Bank can advance even up to the extent of the maximum credit and sometimes it is even exceeded.

36,083. Does the supervisor go to the village of the applicant?—He goes to every village. One supervisor generally supervises 40 to 50 societies. He does go about and see things. It is only when he is dishonest that there is difficulty.

36,084. To look at another side of the picture: the detailed examination which the Committee made of the 75 primary societies of ten years' standing and upwards showed that the existence of these societies had produced results which could not be considered unsatisfactory. Out of a membership of 2,325, 1,354 members had paid off all debt; the position of 294 could not be ascertained, while 677 were still indebted to money-lenders. That shows that certain societies have rendered good service?—Yes.

36,085. Would you like to see the co-operative movement, as such, attempting the consolidation of fragmented holdings?—I have undertaken it, and it has been done to some extent in Saharanpur district where three societies have already been registered. I was put on special duty in this connection in 1921-22, and I have submitted a copy of my report to all the members. Perhaps it should have been, even normally, entrusted to the Co-operative Department, but Government specifically ordered that it should be done through me, as I had worked on it as a special officer. I consulted Mr. Calvert, who is an authority on the subject, and he gave me certain instructions; I followed those instructions very carefully, and I think there is a good promise of consolidation work prospering in some of the districts.

36,086. What type of district is that?—At present the Government ordered that it should be undertaken only in the Meerut Division which is adjoining the Punjab. I consulted the Collectors of three districts, and three Collectors, those of Saharanpur, Bulandshahr and Muzaffarnagar, agreed that the work could be started there with a prospect of success. In Saharanpur alone we have done some real work, while in the other two districts we are yet doing propaganda only.

36,087. On what right are these cultivators holding their land?—Mostly on occupancy; there are some on non-occupancy also who hold life-interest now.

36,088. On page 245 of your note, you say in answer to our Question 5, Finance, that the present rates of interest on loans by primary societies to individual members are rather too high?—Yes.

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36,089. You think they might reasonably go down to 9 per cent.?—Yes.

36,090. "By Government taking upon themselves the responsibility of incurring all cost on co-operative education and supervision, and of distributing *taccavi* through co-operative societies"?—Only to good societies, not to bad societies. I think the Registrar can give a list of such societies to which money could safely be advanced.

36,091. At what rate do Central Banks borrow money?—Generally at 5 to 8 per cent.

36,092. And at what rate do they lend to the primary societies?—Usually at 12 per cent. That amounts to a margin of 4 to 7 per cent.; but they have to spend a good deal on supervision and co-operative education.

36,093. What would you consider a fair percentage to cover administration in the Central Bank?—If they are confined to financing, then it may not be more than 1 or $1\frac{1}{2}$ per cent.

36,094. What is it that makes the management and supervision so expensive under the present arrangement?—They have to undertake co-operative education and organisation of the societies and therefore to employ supervisors and organisers.

36,095. What funds have they in fact to spend on co-operative education?—They have to entertain several supervisors and organisers.

36,096. They have to pay them?—Yes. If they are confined only to financing the members then one manager would do; the supervisors and organisers would not be required.

36,097. Turning to page 247, Question 14 on Implements, you say: "I wrote a pretty exhaustive note on this point in May, 1926, but its office copy has not yet been traced out in the Office of the Registrar of Co-operative Societies," and you promise to send a copy of it as soon as it is traced out. Will you bear that in mind?—Certainly; I am sorry that it has not yet been traced out.

36,098. I suppose that you would not suggest, in this matter of supervision, that the Government should for all time undertake to bear the expense?—No, not for all time, but only so long as the movement cannot stand on its own legs. After all, Government often undertakes to pay 50 per cent. of the expense of aided education, and co-operation is nothing except a kind of education in business principles; education is the main factor in co-operation.

36,099. But there does not appear to have been very much education in the Province up to the present time?—Because we have had a very inadequate staff. The staff was very, very weak indeed, and yet there has been some co-operative education. If the Commission had time, perhaps I could produce many villagers who could prove that they knew something of co-operation.

36,100. Would you turn to page 248, Question 22? You refer to the Oakden Committee's Report and say: "I consider several remarks and suggestions therein not only far too exaggerated but actually wrong." I want to give you an opportunity of pointing out those?—I do not wish to enter into the details of those points now. I only thought that I would be unfair to myself and to the Commission if I did not say anything on the subject.

36,101. I will give you an opportunity of specifying them if you wish to do so?—I do not wish to dilate on this subject.

36,102. In regard to Question 25, on page 249, you say: "I am not in favour of conducting any economic surveys, etc., as they are likely to prove costly and more or less valueless luxuries; the facts ascertained

are also not likely to be accurate" ?—Yes, because people are generally shy in giving out facts. I made some enquiries of the nature and I found they often did not like others prying into their private affairs; they often resent it.

36,103. Have you any personal experience?—When I was put on special duty on consolidation of agricultural holdings, although it was not part of my duties, I made some enquiries and I found that people would not give out facts; they often resented the enquiries.

36,104. And is it from your own efforts in connection with these surveys that you gauge that the facts would not be accurate?—Yes.

36,105. As Registrar of Co-operative Societies, do you regard your office as responsible for the personnel of the Managing Boards of Central Banks?—Not at all; they are elected by the shareholders. Sometimes we wish that a certain man should not be elected, but he is elected in spite of our wishes. We are not at all responsible.

36,106. *Professor Gangulee*: For how long did you say you acted as Registrar, Co-operative Credit Societies?—From 5th August, 1924, to 2nd December, 1926.

36,107. That is for about two years?—Yes, and the appointment of the Oakden Committee was mooted early in 1925, so that I make my position quite clear. It had not much to do with my own work.

36,108. Do you know whether there was any enquiry in these Provinces as regards the extent of agricultural indebtedness?—I do not think so.

36,109. Turning to the question of primary societies, I want to know how often were these primary societies inspected by your supervisors?—The supervisors are the servants of the Central Banks and not of the department. They are expected to visit them at least once every two months, but I am not sure if they do it.

36,110. Can you tell us the nature of such inspections? What do they really inspect?—Their inspection is superficial, I must say. Our Inspectors are very few. There are over 6,000 societies but only 27 Inspectors. I have myself inspected hundreds of primary societies on the spot.

36,111. With regard to this auditing business, at what intervals are these societies' accounts audited?—They should be audited every year.

36,112. Is it done every year?—No, that cannot be done for want of a sufficient number of Auditors. Now that 52 Auditors have been appointed, efforts are being made to see that it is done in future regularly.

36,113. What action do you take when Auditors report on any defects?—This is how many embezzlement cases come to light. Whenever there is anything wrong, we make further enquiries and take necessary action.

36,114. That is with regard to glaring defects. But I am talking of minor defects?—The Auditor is expected to get minor defects corrected on the spot. He should not be a mere cold calculating critic; he should be a real friend and should help them. He should make the correction and tell the people where the mistake lies rather than point out their mistakes as a mere critic.

36,115. In view of the present situation of the co-operative movement in this Province, would you restrict the further extension of the movement and consolidate the present position of the existing societies?—It has been the policy for many years past that there should be very little expansion. We concentrate more on consolidation than on expansion. But there is some expansion, otherwise we would be going back. In promising areas we open out new societies but we concentrate more on consolidation.

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36,116. And on propaganda?—We have had no allotment for propaganda in this Province so far, but now Government have been pleased to allot Rs.15,000 for this year and I think that propaganda work has been taken up seriously now.

36,117. Are you in touch with the Education Department in propaganda work?—Yes, we are trying to be; at present there is very little of that.

36,118. Do you receive non-official assistance in the Province in your propaganda work?—We hold co-operative conferences which are attended by non-officials who fully co-operate with us.

36,119. Do the landlords of the Province help you in this?—Yes, but they cannot undertake any constant, steady, daily work. They can give us some assistance once or twice a year or more but cannot take up daily routine work.

36,120. Did you attend the Registrars' Conference at Bombay in 1926?—Yes.

36,121. There was a proposal about land mortgage banks. Do you agree with the resolutions of that Conference?—The Oakden Committee suggested that there should be no land mortgage banks in this Province. Personally I am of opinion that we should have some of them.

36,122. *Mr. Kamat*: Is there co-operation between your department and the Agricultural Department?—Yes, there must naturally be some co-operation, but at present it is not to the extent which is desired, and that is why I have suggested the formation of a Development Board.

36,123. If that is so, would you kindly explain why the Oakden Committee say that the Co-operative Department has failed to make use of the facilities and help given by the Agricultural Department?—This is one of the points with which I do not agree. In fact, there are many points with which I do not agree.

36,124. You therefore think that this indictment of your department by the Oakden Committee is not correct?—Yes. I do not like to dilate on this unpleasant point, but that is the case.

36,125. Now about the economic position of the cultivators: here is a statement in this memorandum that, in the opinion of the Co-operative Department, 60 to 80 per cent. of the cultivators are in debt. Do you agree with that?—To some extent they are in debt; they are not very much in debt. But I have said that some 25 per cent. are heavily sunk in debt.

36,126. You say that you are not in favour of conducting any economic surveys, and the reason you give for that opinion is that you did carry out some enquiries on this line during the course of your special duty on consolidation of agricultural holdings in 1921-22. "The broad conclusion reached by me," you say, "was that economic conditions were slightly improving though the masses even now live almost from hand to mouth." Do you adhere to that opinion?—Certainly; I think there is some improvement, but I cannot say as yet that they are flourishing.

36,127. I wish to point out to you *per contra* the opinion of the Revenue Department in the memorandum supplied to us. They say: "The conclusions reached in chapter 16 are based, in the main, on a careful comparison of regularly published statistics, and appear to be reliable. If they are accepted, the typical cultivator of the west of the United Provinces is found to be in fairly prosperous circumstances"; and about the eastern portion of the United Provinces they say: "The cultivator of the east, though he pays less rent on a smaller holding, makes a worse living, but he, too, has ordinarily enough and to spare." Now, on the one hand your opinion is that the cultivator is living from hand to mouth, and on the other the Revenue Department says that he has a surplus?—I did not say that they lived entirely from hand to mouth, but almost

from hand to mouth. I say the ryot's condition has been a good deal improved, but even now he lives almost from hand to mouth. The word "almost" is important.

36,128. Are you inclined to support the opinion of the Revenue Department about the surplus, or are you inclined to adhere to your own opinion?—I have given you my own personal opinion, and it is for you to draw your own conclusions.

36,129. Even after this divergence of opinion between the opinion of the Revenue Department and your own opinion?—I do not think that there is much divergence; it is only a question of opinion.

36,130. But there is some divergence?—Some opinions always must differ.

36,131. If there is some divergence, never mind whether it is large or small, do you not think an economic inquiry into small villages, at any rate, would be desirable?—I think that is resented by the people concerned, and it will not be of much use. I have said already that it will be more or less valueless, and that the figures will not be accurate.

36,132. If two responsible departments differ in their conclusions, would it not be better to have an economic inquiry?—The Revenue Department claim that they have conducted careful inquiries, but I have done it in a summary fashion while I was on special duty for a few months. I do not claim that my opinion must be considered as valuable in this connection as the opinion of the Revenue Department.

36,133. *Sir Thomas Middleton*: In what sense do you use the term *mahajan*? Do you mean the big moneylender or the ordinary village moneylender?—The petty moneylender.

36,134. You mentioned the case of the Dewan of an Indian State who was compelled to guarantee the loans to *mahajans*. If you were faced with a situation like that, what steps would you have taken?—Perhaps I would do the same.

36,135. There is no doubt that the character and the quality of the *mahajans* of that State would have varied widely. I want to know whether you would not have tried to discriminate between such people before guaranteeing the loans?—I do not follow the question. I see that men advance money. A *badmash's* rupee is worth 16 annas and a good man's rupee is worth the very same.

36,136. There is something behind my question. There would be in such a State a large number of *mahajans* who would come applying to the Dewan for a guarantee. He could make a selection from among them? Could that not be possible?—Possibly it may be so, but I really do not see any difference. Why should I make a selection in case of creditors when one man's rupee is worth the same as another man's rupee?

36,137. If he were to make a selection, do you think it is not possible that he might come to terms with the *mahajans* as to the rates of interest which they would charge?—The rate of interest was uniform; it was all *sawai*, i.e., 25 per cent.

36,138. So that your attitude would have been the same as his, that is, guaranteeing without conditions?—Unless, of course, I knew that usurious rates of interest were being charged; if the rates of interest were uniform and reasonable, then I would not differentiate.

36,139. *Raja Sir Rampal Singh*: You have stated that the control of the Central Banks should be done away with, but at the same time they should go on financing assistance?—I did not say that control should be done away with; I spoke of supervision and co-operative education; financial control will remain. The former means more responsibility than power, I think.

36,140. In what way?—I am of the opinion that supervision, co-operative education and organisation involve more responsibility than power.

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36,141. Supposing a society sends a list of members to whom loans should be advanced, if the Central Bank is not allowed to scrutinise that list, would depositors come forward to deposit money in the Central Bank?—Yes; provided the Central Bank took care to see that the society itself as a whole was solvent, people would come forward to deposit money. The Central Bank should deal with societies and not with individual members of societies; otherwise it saps the foundations of co-operation.

36,142. Do you not find a tendency amongst members of societies to have a big loan taken by every member, instead of attending to the real wants of the members?—If every member wants too much, then the society as a whole will want so much more, and the Central Bank will not advance beyond the normal credit of the society. Therefore, the safety is there. Why should the Central Bank advance beyond the normal credit of the society?

36,143. You propose that every supervision should be exercised by the Co-operative Department?—What I mean to say is that the responsibility for organisation, co-operative education and supervision should be undertaken by the Co-operative Department. The banks can make any enquiries as to the solvency of the societies or as to the solvency of the members of societies, and anything like that; we do not want to interfere with their powers in this respect.

36,144. What is the annual grant of the Government for the Co-operative Department?—At present it is somewhere in the neighbourhood of Rs.2 lakhs.

36,145. I hear it is much less than what is provided by other Provinces?—It is the smallest throughout India, so far as I know, amongst the major Provinces.

36,146. *Mr. Calvert*: Smallest per member?—I do not think it is the smallest per member, but the amount is the smallest amongst the major Provinces. I do not mean to criticise Government, but, nevertheless, I think that if it had been possible for Government to give adequate financial assistance to the co-operative movement, perhaps we would have been in a far better position.

36,147. *Raja Sir Rampal Singh*: Would it not have been better if the department had concentrated all its energies over certain localities, instead of diffusing their energies all over the Province?—Perhaps there is some truth in this, but we cannot entirely ignore the wishes of Central Banks. We have to consider and take into account the desires of non-officials in the Province also, and, if they desire a thing, we generally do not wish to override them without very good reasons.

36,148. In years of calamity, have you any experience that even landlords come forward to stand as guarantee for the loans to be given by mahajans?—Yes: I myself do it. I am also a landlord, besides being a Government servant, and in my estate this is done.

36,149. *Professor Gangulee*: You state that the responsibility for co-operative education rests on your department?—I say it should rest on my department.

36,150. We have a note before us, in which, referring to the department, it is stated: "Many officers do not know what co-operation is. To them co-operation means that Government is to supply them with a few simple books"?—Where is this statement?

36,151. In a note submitted to us by one of the officers. Would you agree with it?—The statement is much too sweeping, and I challenge its accuracy. It is not correct. I think it referred to the Revenue Department.

(The witness withdrew.)

The Commission then adjourned till 10.30 a.m. on Friday, the 4th February, 1927.

Friday, February 4th, 1927.

LUCKNOW.

PRESENT :

The MARQUESS OF LINLITHGOW, D.L. (*Chairman*).

Sir HENRY STAVELEY LAWRENCE,
K.C.S.I., I.C.S.

Sir THOMAS MIDDLETON, K.B.E.,
O.B.

Raj BAHADUR SIR GANGA RAM, Kt.,
C.I.E., M.V.O.

Sir JAMES MACKENNA, Kt., C.I.E.,
I.C.S.

Mr. H. CALVERT, C.I.E., I.C.S.

Raja SRI KRISHNA CHANDRA
GAJAPATI NARAYANA DEO OF
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Professor N. GANGULEE.

Mr. B. S. KAMAT.

Mr. A. W. PIM, C.S.I., C.I.E., I.O.S., } (*Co-opted Members.*)
Raja Sir RAMPAL SINGH.

Mr. J. A. MADAN, I.C.S., } (*Joint Secretaries.*)
Mr. F. W. H. SMITH.

Captain S. G. M. HICKEY, M.R.C.V.S., I.V.S., Veterinary
Adviser to the Government of the United Provinces.

Replies to the Questionnaire.

QUESTION 15.—(a) The Civil Veterinary Department should be run absolutely independent of the Director of Agriculture, but veterinary, agriculture and breeding operations should come under one Minister. The Departments of Veterinary and Agriculture, although maintained for the welfare of agriculturists and the general public, differ very much in the functions of their duties, and each should be run by their own technical officers, responsible to one Minister, as it is done in other countries. In the year 1919, when the Department of Agriculture and Land Records (under which the Veterinary Department then came) was split into two separate departments, with their own technical officers and an agricultural officer made Director of Agriculture, which post was previously held by an officer of the Indian Civil Service, the Veterinary Department was made independent, with a veterinary officer as adviser, which up to now has proved satisfactory. If the control of the Veterinary Department was vested in the Director of Agriculture, who does not possess any veterinary qualifications, it would be sure to create a cause of great dissatisfaction amongst officers of the department, and there is always the fear that instead of the department progressing it would be left to stagnate, preference being given to the Agricultural Department, to which service the Director would belong.

Dispensaries in these Provinces are maintained by District Boards, who pay yearly to Government a fixed sum (Rs.672) for each Veterinary Assistant Surgeon lent to them; they also provide funds for medicines, instruments

and hospital necessities and find accommodation for the hospitals or dispensaries. Officers of the Veterinary Department inspect the work of Veterinary Assistant Surgeons and advise the District Boards as to the proper running of veterinary work in their districts; also check the field and inoculation work carried out by Veterinary Assistant Surgeons. But I am sorry to say that most Boards are very apathetic, not providing sufficient funds for the proper maintenance of the veterinary work in their districts, and little or no action is taken on remarks and suggestions passed from time to time by inspecting officers on the proper working of the dispensaries. Also the system under which the department is run in these Provinces being dual, we are always at the mercy of the District Boards for the opening of new dispensaries, etc. We have experienced great hardships by some boards trying to cut down the number of their Veterinary Assistant Surgeons under the old plea of insufficient funds. India is the only country where the dual system would be tolerated for a moment. In countries like America and South Africa, where State aid is given for veterinary work, the working is entirely in the hands of the Veterinary Department, who are in a much better position to be able to state what medicines, etc., are required and where and when new hospitals and dispensaries should be opened. Another point I should like to bring before the Commission is the inadequate housing accommodation made by most District Boards for the accommodation of veterinary hospitals and dispensaries. Except in a very few instances the housing accommodation is totally inadequate and in no way suitable. It usually consists of a hired house on a cheap rent which lends itself in no way for the class of work that is required of it. They have no proper accommodation for in-patients and are usually situated in the worst locality. Also, under the dual system, the Veterinary Assistant Surgeons are apt to play off their departmental officers against the District Boards and *vice versa*. If the whole of the veterinary work was solely under the Veterinary Department, it would mean that we should have better working, suggestions, when made, if possible, would be carried out, medicines and instruments would be supplied in proper time and not, as now, when the District Boards like.

(ii) The department has expanded during the last ten years, but not in proportion to the needs of the Province.

A Veterinary Assistant Surgeon in charge of an area has got such an extensive circle under his charge that it is often the case that it is impossible for him to manage to visit each and every place which is reported to be affected. To assist him, when possible, the headquarters Veterinary Assistant Surgeons and sometimes Inspectors are deputed, but they are too few to render any substantial help. Besides that, in the United Provinces the climate is such that epidemics break out in several districts at the same time, and so it becomes an impossibility to shift the staff from one district to another. The hands of the local staff become so full of work at times that they cannot leave one part of the area to attend outbreaks prevailing in another part; this means serious losses amongst agricultural stock and the continuation and spread of contagious disease. It is therefore essential that the department should keep enough hands in reserve to meet such contingencies.

Then the staff maintained in a district is extremely inadequate to meet the needs of the department. On an average, a district which has got half a dozen tehsils of hundreds of square miles or so each is allowed not more than four Veterinary Assistant Surgeons, although under the standing orders each tehsil should have a separate Veterinary Assistant Surgeon.

I would go further and say that even one Veterinary Assistant Surgeon in each tehsil is totally inadequate to meet the requirements of to-day if contagious disease is going to be in any effectual way suppressed, and

would suggest that two Veterinary Assistant Surgeons should be allotted to each tehsil, one on purely itinerating work and the other on combined work, who, when there is no contagious disease, should run a hospital or dispensary, and when contagious disease appears should at once proceed and help the itinerating Veterinary Assistant Surgeon to suppress it as soon as possible. Also, when the itinerating Veterinary Assistant is not attending outbreaks, he should at stated intervals visit the larger villages and markets, staying a day or so and carrying out ordinary treatment amongst the animal stock. This is urgently needed, as one can see while touring through the districts. The rural population, except within, say, a radius of five miles of a veterinary hospital or dispensary, has very little help given them for ordinary disease, such as wounds, infection with maggots, injuries, etc. This, I think, would be gradually overcome if, as stated above, the itinerating Veterinary Assistant Surgeons, when not engaged with outbreaks duty, paid regular visits to the larger villages. The villagers, after a time, would get to know of this and would bring their animals for treatment, as I am sure many working hours are lost due to minor ailments of the livestock.

The question of inadequacy of the present staff, the large areas these men have to look after, etc., is, therefore, of such vital importance to the stock owners of this Province that it deserves immediate consideration at the hands of the higher authorities. Undoubtedly, inoculation is the best remedy to arrest epidemics, but it requires an adequate staff and great organisation to make it thoroughly effective.

(iii) Yes. Before the inauguration of the Reforms, the present system of the administration of the department worked fairly well, as the official chairmen had a great regard for the advice of the departmental officers, but even then there were drawbacks in the system. But now with the non-official chairmen the department is suffering greatly, and in some instances veterinary work, instead of progressing, has been retarded. The dual system of control is practically impossible with a subject like veterinary work, and in no country in the world, where there is State-aided veterinary work, is the system under a dual control. Take, for instance, in the great outbreak of foot-and-mouth disease at Home, the work of the Board of Agriculture and Fisheries would have been retarded if Borough Councils had had the power of saying that they did not see the reason for shutting up infected farms and the veterinary officers need not proceed to seats of outbreaks as the disease was widespread. This has been my experience with some District Boards.

My presumption, based on the experience so far gained in the discharge of my duties, is that in a country like India, with all her prejudices, ignorance, want of organisation, etc., any scientific department, and specially of a recent birth like our Civil Veterinary Department, cannot successfully be run less it is under the direct control and the supervision of the Government technical officers. The difficulties at present experienced and instances daily met with, for want of independent technical control, I think, are more than sufficient to support my views.

After the coming of the Reforms, it was experienced in the year 1923-24 that the majority of District Boards, instead of helping us to improve veterinary work in their districts, tried in every way to hinder and retard the work, by trying to cut down the number of Veterinary Assistant Surgeons under their control, not giving adequate funds for medicines and instruments or giving suitable accommodation for the housing of the veterinary hospitals or dispensaries. Usually the building provided as a veterinary hospital or dispensary, with the exception of several well-built hospitals and dispensaries, most of which were in existence before the

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Reforms came in, are totally inadequate and not at all suited for the purpose. In the great majority of cases the housing accommodation allowed is a small hired building, without any adequate accommodation for in-patients, and usually not over-sanitary.

Another way some District Boards have hampered the work of the department is by the issuing of orders to their Veterinary Assistant Surgeons that they are not to go on tours until they get permission from the chairmen. This means that in a great majority of cases, when the Veterinary Assistant Surgeons have obtained permission and proceeded to the scene of outbreak, they find that the disease has subsided or has spread to such an extent that the district staff is totally incapable of coping with it, and the adjoining districts thereby become affected.

Another way, again, is the present tendency of several District Boards to hand over their *sudder* veterinary hospitals to the Municipal Boards. Their excuse is usually want of funds or that the majority of cases brought for treatment come from the municipal area, and they do not see why they should run the hospital.

Ever since the Reforms came, it has been uphill work for the Veterinary Adviser, the Circle Superintendents and the Deputy Superintendents to try, persuade and make the District Boards see that if contagious diseases are going to be suppressed there must be an adequate veterinary personnel in each district to control the diseases and carry out the work. Valuable time of the officers of the department has been wasted by attending District Board meetings explaining to them the needs of the veterinary work and trying to make them see the necessity of maintaining the minimum number of Veterinary Assistant Surgeons as laid down by Government, and even at the present time correspondence is going on between the department and a District Board with reference to the doing away with two of their Veterinary Assistant Surgeons out of four.

Also I should like to bring to the notice of the Commission that under the present dual system we have very little power over our subordinate staff and experience great difficulties in the transferring of Veterinary Assistant Surgeons as disciplinary measures or in the interest of the department. It has been found that if a Veterinary Assistant Surgeon does not want to be transferred, he goes and gets the District Board to say he is indispensable, which causes a lot of correspondence and unnecessary work, besides making bad relationship between the department and the Board.

All District and Municipal Boards and notified areas should be made to pay yearly to Government a sum of money fixed on the area of the district in the case of District Boards, size and population in the case of Municipal Boards and notified areas for veterinary relief, and the department should be responsible for the entire running of the veterinary work of the Province. The rest of the money should be met by Government as at the present time.

Government at present meets the pay, travelling allowances, etc., of all officers, with the exception of district Veterinary Assistant Surgeons, for whom the District Board contributes at the rate of Rs.56 per mensem for each man, the deficit being met by Government.

(c) (i).—During my fifteen years' service in India I have seen that agriculturists from year to year make greater use of the Veterinary Department. But, as stated to question 15 (b) (ii), they are so few and between that full use cannot be made of them. The rural population is still very ignorant and full of religious prejudices so that they are liable to show great apathy towards the minor ailments of their livestock. Not only does this exist in the rural areas, but it is found in the larger towns as well. Nearly every *ekha* pony and bullock or buffalo working on the roads are suffering from some minor ailments such as wounds, saddle or girth galls and in

bullocks and buffaloes neck galls. Directly a wound or gall appears instead of going to the nearest hospital for treatment, they rub in some decoction of their own and continue to work the animal, and when the animal is totally unfit for work then they seek veterinary aid. This can only be overcome if sufficient institutions are formed where they can obtain treatment, adequate supply of drugs, etc., and a lot of propaganda work is done. Also I would suggest that legislation on the lines of the Prevention of Cruelty to Animals Act should be brought into force and properly carried out.

(ii).—There are no travelling veterinary dispensaries in the Province. Some years back there were two, but the Boards concerned could not maintain them owing to want of funds.

(d).—The present system of controlling epidemics without legislation is effective in its way if properly carried out, but it has got its own drawback which cannot be easily remedied. The *patwaris* are proverbially slow and careless and they have got such onerous duties of their own to discharge that they hardly get time to deal with other affairs. There is a general complaint that they never submit their reports in time which has been from time to time brought to the notice of Government and it is only when the epidemics assume a virulent form that they awaken to bring the matter to the notice of the authorities. In this manner the work of the veterinary staff becomes very difficult and it takes time before the spread of the epidemic is arrested. But it appears that this cannot be helped. There is no other agency that may be suggested in place of the *patwaris*. The *chaukidars* are said to be over worked and as their circles, according to the new Reforms, have been enlarged it has become all the more difficult to get any extra work from them. Moreover, they are illiterate and so they are not likely to be of great assistance in the matter. We have for good or for bad to rely upon the *patwaris* and they should be given something in the form of a reward for honest and good work; if this is done, there is every chance that some improvement will be effected. It is therefore necessary that some amount should be allotted annually to every district for this purpose under the control of the Veterinary Department. Also rewards in the form of *sanads*, money, etc., should be given to villagers who come forward and report outbreaks direct to the Veterinary Assistant Surgeons concerned or even to the nearest police station or outpost who could easily despatch the information to the nearest Veterinary Assistant Surgeon for action. The present reporting system will only be effectual and of real benefit when we can get the people so educated that they voluntarily come forward and report disease themselves. A lot could be done if the educational authorities could see their way to give instruction in all village schools of the benefits of quick reporting and the prompt carrying out of inoculation whenever a contagious disease appears. There can be no two opinions about it that segregation is the second best remedy, but in the United Provinces it has never been a success. In the first place, there is no legislation compelling the agriculturists and other people to keep their stock isolated at places fixed by the officers of the department during an epidemic. This has been borne out each year when *surra* breaks out in the Province. A Veterinary Assistant Surgeon, on either diagnosing a case or it being reported to him, orders the owners of all suspected cases to isolate their animals while he submits blood smears for microscopic examination. On his return with the information that the slides submitted were either positive or negative, it is invariably found that one or more persons have taken their animals from the isolation camp and absconded. If the animal of an absconding owner has proved positive it may take months, if ever, before he can be traced by the district authorities and usually it is found that his animal has died and must have been the source of starting fresh outbreaks wherever he stopped, and secondly, the ignorance of the peasants is a great stumbling block to the improve-

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ment of the system. The sound advice given to them falls on deaf ears and nobody is ready to move an inch from the old position which is based on superstition. With sufficient increase in the staff, it may be possible to improve the situation, and if the Government is prepared to enforce some legislation all that is desired will be easily achieved.

This department has often tried to educate the agricultural classes in the importance of segregation as a preventive in contagious diseases by issuing pamphlets on the subject at horse and cattle shows and agricultural exhibitions; but besides enlightening a few advanced and educated agriculturists they have not done much to the peasants in general and in my opinion it can only be brought about by legislation on the same lines as it is carried out in other countries, i.e., Diseases of Animals Act. The educational department has proposed to issue instructions in animal husbandry which, I think, is a step in the right direction if the importance of this is duly impressed on the younger generation.

The third best remedy to prevent epidemics is treatment and it is provided for as far as possible in cases for which there is no inoculation. But this is a matter which depends a great deal on funds. The local bodies do not take sufficient interest, with the result that a very meagre allotment is made for the purpose. However, every endeavour should be made in this connection to stimulate public interest amongst local bodies to this phase in the suppression of contagious diseases.

At a very early date rules should be framed on the lines of the Diseases of Animals Act as in force in other countries.

Whenever practicable, segregation should be made compulsory and the local Government should see that it is carried out, also rules should be framed to stop the transport of animals from or through one infected Province to another or from an infected district to another non-infected district. In this way, an effective control could be put on most of the contagious diseases, as at the present time the unrestricted movements of animals help to spread the disease and in this way India loses thousands of heads of live stock annually.

Steps should be taken by the Government of India to encourage Indian States to take an interest in veterinary matters by establishing veterinary dispensaries in their States.

(e).—The serum supply is not always sufficient to meet the demand for want of sufficient funds to defray the cost of the supply.

(f).—No fee is charged for inoculation from the public. The obstacles in the way of preventive inoculation have already been dealt with in other paragraphs.

(g), (i), (ii) and (h), (i) (ii).—In a country like India where nearly every existing contagious disease is prevalent it is essential that the greatest facilities for research should be made by giving adequate funds both from the Provincial and Central Governments. Each Province should have a properly equipped veterinary research institute under a special research officer who will carry out research work on the contagious diseases commonly met with in the Province and also any disease peculiar to a special tract. In this way, Muktesar Institute could be used for special research work and collaborating the work done by the provincial veterinary research institutes. India being such a vast country it stands to reason that one institute is not enough and valuable material and data could be collected by each provincial veterinary research institute and the whole checked by Muktesar. Then a lot of work now done by Muktesar would be done by the provincial veterinary research institutes leaving the special work of preparing vaccines, sera, etc., to Muktesar, which would save a lot of time as the provincial research officer would be on the spot.

(i).—Yes. There being no representative with the Government of India, as the other departments have, to advise the Government of India on veterinary matters and also give advice to heads of departments in different Provinces, the appointment of a superior veterinary officer with the Government of India is extremely desirable.

At the present time each Province is more or less run on different lines and nothing has been done to centralise and organise the veterinary work in India so that precautionary measures can be taken to stop diseases entering from one Province to another or from Native States into British India or *vice versa*. But, on the other hand, by giving each provincial Government full power it has been left to them to run the department on any lines they like.

It is therefore essential at such a time as this, when the idea of the Government of India is to intensify agriculture and in such a country like India where the cultivator depends entirely on his cattle for every farming operation he carries out, such as ploughing, threshing, and carting his goods that we should be represented in the Government of India with an adviser like the Agricultural Department. He could advise the Government of India in their veterinary policy, and also the head of the Veterinary Department in the different Provinces could go to him for advice and guidance in the efficient running of the department or in such an instance, if it were to arise, when the Veterinary Adviser of a Province disagreed with the views of his local Government, he could go up to the adviser with his case who would then decide who was in the right. The Adviser to the Government of India should, at the same time, be the Director of the Veterinary Research Institute, Muktesar, who should be an administrative head. It is also essential that we should have a head with the Government of India like other technical departments to advise the Government of India as this cannot be adequately done by a non-technical man or an officer from another department as it is being done at present.

Oral Evidence.

36,152. *The Chairman*: Captain Hickey, you are Veterinary Adviser to the Government of the United Provinces?—Yes.

36,153. You have provided us with a note of your evidence; would you like to make any statement at this stage in amplification of those notes, or may we ask you some questions?—I have nothing to add.

36,154. Are you satisfied with the degree of touch and inter-communication that exist between yourself as head of your Department and the Agricultural Department?—Yes.

36,155. The Veterinary and Agricultural Departments are entirely separate in this Province?—Yes.

36,156. So that it is very necessary that there should be sympathetic understanding between the heads of the two Departments?—Yes.

36,157. And that you think exists?—It exists here, yes.

36,158. On page 261 of your note, you deal with the question of District Boards in their relation to veterinary dispensaries. What exactly is the extent of responsibility of District Boards? They administer these dispensaries?—Yes.

36,159. To what extent do they control the actions of the Veterinary Assistants who practise at those dispensaries?—The Government lend the Veterinary Assistant; the District Boards pay a moiety of his pay, and they supply medicines, hospital, sometimes a compounder, and the ordinary menial staff; when there is an outbreak of disease the District Boards have the right to let the man go or not.

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36,160. But do the District Boards exercise authority over the Veterinary Assistant from the technical point of view?—No; I am the technical officer responsible.

36,161. So that there is dual responsibility?—Yes.

36,162. You are responsible on the technical side?—Yes; the District Boards are responsible for maintenance; they can stop advancement in a district if they like, or they can decide to advance.

36,163. The District Boards can also control the numbers of the Veterinary Assistants?—Yes.

36,164. I understand you suggest that these dispensaries ought to be under your own control?—Yes.

36,165. Have you any indication as to what view public opinion would take of a step of that sort?—I have consulted several chairmen, and they are quite willing to do it if they pay a moiety and Government pay the rest.

36,166. Have you ever heard it suggested that that would be regarded as a retrograde step?—I do not think so, no.

36,167. I suppose in most districts there are one or two men who might reasonably be described as enthusiasts from a veterinary point of view?—Yes.

36,168. But the difficulty is that they are not always the men who get elected to the Boards?—Yes, and also some of the people who are elected do not even know of the veterinary work.

36,169. Have you ever considered the possibility of nomination to the District Boards as a way out of the difficulty?—The only way out of the difficulty that I see is to do what is done in other countries such as America and South Africa where it is a State-aided work and the State carries out the whole work.

36,170. But have you ever suggested the nomination at your recommendation of, say, one member to the Board when the Board is discussing veterinary matters?—I could send an Inspector or a deputy, or I myself could go to a Board meeting; we had to do that at one time in order to keep even our small staff going on, as some Boards wanted to cut their staff in a way that would abolish large sections of it.

36,171. The difficulty is that you cannot be everywhere at the same time?—Yes.

36,172. That being so, would you favour the idea of your right to attend the Board on these occasions being delegated to some person in the district who was an enthusiast in this particular direction?—I do not think it would work.

36,173. On page 262, in answer to Question 15, you say: "After the coming of the Reforms it was experienced in the year 1923-24 that the majority of District Boards, instead of helping us to improve veterinary work in their districts, tried in every way to hinder and retard the work, by trying to cut down the number of Veterinary Assistant Surgeons under their control," and so on. Was that because the functions of the local authorities were extended at that time and a shortage of funds occurred?—A shortage of funds was one thing, and another thing was that we got non-official chairmen. Before then the Collector or the Deputy Commissioner was the head, and instead of that we had an elected non-official chairman. A lot of chairmen have told me they would do what I asked them to do if they had backing.

36,174. Are there any signs of an increasing interest in veterinary work on the part of Boards?—When a Board is elected, the work may progress during their period of service, but when there is a new Board, we have to start working with them again.

36,175. Assuming that the idea of taking away the powers from the local authorities and making them over to you is for one reason or another held to be impracticable, then plainly the best hope lies in trying to increase the interest shown by members of Local Boards in veterinary matters; have you ever considered the possibility of that?—By propaganda?

36,176. Or any other means?—With our small staff we have no other means.

36,177. Has it ever been suggested in this Province that the Veterinary Assistants working in the dispensaries should be under the direct control of District Boards?—No.

36,178. On page 264, in answer to Question 15, you say: "A lot could be done if the educational authorities could see their way to give instruction in all village schools of the benefits of quick reporting and the prompt carrying out of inoculation whenever a contagious disease appears"?—The educational authorities have now taken that up.

36,179. Have you approached the educational authorities?—The educational authorities approached me and asked me to get out a book for them on sanitation, hygiene, animal ailments and breeds.

36,180. On page 265, in answer to Question 15 (d), you suggest legislation in the shape of a Diseases of Animals Act. Do you think it would be possible to administer regulations of that sort in this country?—I should fancy it would, after a time if properly worked and sufficient money were given by Government, of course; it would have to be brought in on a small scale to start with and gradually extended.

36,181. It would require a large force of veterinary police, would it not?—I do not think so.

36,182. Would not a good deal of policing be required to control, for instance, the movement of animals from one district to another?—Yes, it would in a way.

36,183. In the same way you suggest that segregation may be made compulsory. If you made it compulsory, you would be up against the same difficulty of enforcing the rule, would you not?—Yes, you will have the same difficulty of enforcing the rule; but there must be something like that.

36,184. You do feel that in spite of the difficulties of the administration it would be worth while to pass an Act of that sort at once?—Yes.

36,185. On the same page you point out that the serum supply is not always sufficient to meet the demand. A previous witness in this Province, a landowner, told the Commission that he had the experience of rinderpest infection in his own herd and had applied to the local dispensary, but not only was there delay, but the serum never appeared at all. That was last year?—We have spent all our funds, and there is the difficulty of finding funds. In the hills we have to give 18 to 20 times the dose we have to give in the plains.

36,186. Why is that?—Because the animals in the hills are much more susceptible to the disease.

36,187. You take an interest in the improvement of the breeds of cattle in the Province?—Yes.

36,188. Have you any suggestions to make outside the familiar ones for achieving that end? I take it that the fodder problem is one of the central questions?—Yes. Most of the animals in this Province are from their birth upwards not fed properly.

36,189. How long have you known this Province?—From 1916.

36,190. Do you see any change for the better or for the worse in the condition of the cattle?—I think there is a slight improvement in the condition of the cattle.

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36,191. To what do you attribute that?—People are taking more interest, in my opinion, in the veterinary work, and I think there is a slight improvement in the breed. But there is a vast amount to be done.

36,192. Have you any demand for the simultaneous method of inoculation from the public?—No. At the present moment the villager has to be asked to have even the ordinary serum inoculation.

36,193. But you have large landlords in the country side who might be expected to ask for the simultaneous method?—Up till now only Mr. Sam Higginbottom of Allahabad has asked for it.

36,194. *Sir James MacKenna*: What is your staff at present, starting from above?—The Veterinary Adviser who is myself, and two Circle officers, one being of the Indian Civil Veterinary Department, and the other having come from the subordinate grade.

36,195. Into how many circles is the Province divided?—Into three circles, Allahabad, Agra and Lucknow.

36,196. You take a circle yourself?—Yes. Then there are 16 Veterinary Inspectors, roughly one to three districts, and 179 Veterinary Assistants of whom 15 belong to my personal staff.

36,197. A flying squad?—They are really meant for that purpose; but most of the Boards have not got sufficient staff and most of these Assistants work in the districts.

36,198. 179 for how many districts?—It works to about three to four per district.

36,199. You consider that staff adequate?—No; it is totally inadequate.

36,200. What is your scheme?—My scheme is to have two to three Veterinary Assistants for each tehsil.

36,201. What do you have here, permanent fixed dispensaries?—We have here certain hospitals where the Veterinary Assistant in charge goes out only when there is a bad outbreak of disease.

36,202. You have served in the Central Provinces and Assam. What is the incidence of cattle disease in this Province, relatively, as compared with that in the other two Provinces?—It is very difficult to compare. Here you have the hill tracts, Garhwal and Almora, which are very difficult to control.

36,203. Looking at the figures printed in the provincial memorandum, I think the incidence of cattle disease is not particularly high, 18,000 a year out of a population of 41 millions. It would not be regarded as particularly high, would it?—No.

36,204. You have no scheme for training students of your own?—There was a scheme.

36,205. Have you any research facilities?—I have a laboratory; but I have no time to work in it. What we want is an officer who could have time to give some refresher courses.

36,206. How do you recruit the Veterinary Inspectors?—They are promoted from the Veterinary Assistants' grade.

36,207. Do you give them any refresher courses at all?—Some are sent to Muktesar. We sent three men last year for training in the simultaneous method.

36,208. How do you train your Deputy Superintendents?—They are selected from among the Inspectors.

36,209. So that you have a steady rise from the Veterinary Assistants' grade?—Yes.

36,210. Are they English speaking?—Some are English-speaking and others are not. All the new graduates are English-speaking; but the people recruited long ago are not English-speaking.

36,211. From the veterinary point of view which type of Veterinary Assistant do you find better, the English speaking or the non-English speaking?—The English speaking ought to be better because he can learn more things.

36,212. What about the quality of the Veterinary Assistant?—I think the English-speaking man is a better qualified man.

36,213. Is he good at handling cattle?—Yes.

36,214. Do the Veterinary Assistants come from the agricultural class?—They come from all classes; most of them are from the agricultural class.

36,215. Do you think the present arrangement of relying on the Punjab for education is satisfactory or could you make out a case for a separate school?—I should like to have a central school for the whole of India.

36,216. Teaching in English?—Yes, up to the same standard as at Home.

36,217. Do you think the Royal College of Veterinary Surgeons would recognise the Indian degree?—Yes, if the latter is of the same standard.

36,218. About the serum difficulty, do you think it should be the duty of the Government to provide the serum free?—Yes, of the Central Government; it is only robbing Peter to pay Paul.

36,219. You think that as far as the serum manufacture is concerned, in view of the far-reaching effects of inoculation, it should be a gift from the Central Government?—Yes.

36,220. As regards the question of the revival of the post of Inspector-General of the Veterinary Department or Veterinary Adviser to the Government of India, where, in your view should that officer be located?—He should be under the Government of India and Muktesar should be under his charge.

36,221. Do you think there is enough work for a whole time officer?—Yes.

36,222. What sort of problems are likely to go up to him?—The Cattle Diseases Act and things like that.

36,223. Do you think that that would probably stimulate veterinary research in the Provinces?—I think it would stimulate veterinary work in the Government of India. There is no officer at the present moment to advise the Government of India in any way.

36,224. Have you got a complete scheme worked out for the development of the department in the Province?—We are waiting for a scheme from the Government of India.

36,225. You want to know the method of recruitment proposed?—Yes.

36,226. Have you got a paper scheme for the expansion of your staff at the rate of two or three Veterinary Assistants for a tahsil?—We are preparing such a scheme.

36,227. You are not particularly heavily loaded in the matter of superior staff?—No, it is not enough.

36,228. What is your idea of the charge of a Deputy Superintendent? That he should be in charge of a Commissioner's Division?—About that.

36,229. What about the Inspector?—He should be in charge of two districts.

36,230. That would bring the number to 25?—Yes, and four circle officers and one research officer.

36,231. And a Veterinary Adviser?—Yes.

36,232. *Professor Gangulee*: Rinderpest, I understand, is by far the most common cattle disease in the United Provinces?—Yes.

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36,233. Can you give us an idea as to what is your agency for notifying an outbreak?—It is done in this Province by the *patwari* who reports to the nearest Veterinary Assistant; on receipt of this report the Veterinary Assistant sometimes asks the permission of the District Board and then proceeds to the scene; he finds out what the disease is and then he tries to get the villager to agree to inoculation if the disease is inoculable, and lastly he wires to me for serum.

36,234. What lapse of time takes place from the outbreak of the disease till the day the information reaches your headquarters?—The average is about a month. Our reporting agency is very bad.

36,235. Perhaps by the time the report reaches you the outbreak is over?—Yes, especially in *hæmorrhagic septicæmia*.

36,236. How would you improve this method of reporting? Have you any suggestions?—The only suggestion is to try and get the people themselves to report.

36,237. Have you the post-card system here?—We had it, but it was not a success.

36,238. For how long did you try it?—About twenty-two years.

36,239. The official records which show the prevalence of these contagious diseases are, I presume, not quite reliable if that is the sort of reporting agency you have?—I think no statistics are reliable really.

36,240. There is perhaps more disease than is actually reported?—Yes, because when the Veterinary Assistant is on tour in a village no report is made sometimes.

36,241. How long does the effect of the serum inoculation last?—Some people say it lasts for a month, some say for a fortnight.

36,242. The figure given in Mr. Edwards' paper is nine days?—Captain Pool worked it out to a fortnight, Colonel Holmes said it was two months and Professor Lingard put it at one year.

36,243. Do you notice any periodicity in the outbreaks of rinderpest?—Yes, if you work it out on a graph you will find that it goes up and down. The cold season brings more of it than the dry season.

36,244. If I remember aright, the germs responsible for rinderpest do not live long in the soil; in India they perish under normal conditions?—No, it can be carried by water, because it is a water-borne disease.

36,245. It lives in the soil also?—I should say in damp soil. Among the Muttra cattle farms we had two outbreaks which were brought about by water.

36,246. I know Mr. Edwards stated that it perishes on exposure upon the soil in ordinary conditions in India within two days?—The virus does, but in damp soil or water it will live longer.

36,247. You say that serum-simultaneous inoculation is not popular here?—Because all that is being done by Muktesar, and nothing is being done by my officials. The other day an officer came to Allahabad to do it.

36,248. Is that because your officers are not sufficiently trained in the methods of serum inoculation?—No, it is the scientist's job. You cannot do it for a little while and then leave it there. You have got to watch the whole operation.

36,249. Could the veterinary personnel now under you do it without any expert guidance?—Yes, but we should really have camps for that work.

36,250. Do accidents sometimes take place in the application of the serum-simultaneous method?—Yes.

36,251. What are these accidents chiefly due to?—To too big a dose of the serum.

36,252. Have you had some accidents?—Muktesar has had them. There is no harm in the ordinary serum which we use.

36,253. The ordinary serum inoculation is done by your Veterinary Assistants?—Yes.

36,254. Where are they educated?—Either at Lahore or at Bombay or in Bengal.

36,255. Do they understand the problems of controlling these epizootic diseases?—Yes, they understand the ideas.

36,256. Do you know who teaches veterinary science in the Agricultural College at Cawnpore?—One of our Veterinary Assistants is lent to the Agricultural Department.

36,257. For how long is he lent? Does he give a regular course of training?—He is attached to the College.

36,258. Are you in touch with the cattle-breeding stations here in the United Provinces?—Yes, from the disease point of view.

36,259. *Mr. Calvert*: In your note you suggest legislation on the lines of the Prevention of Cruelty to Animals Act? Do you mean that the present Act should be extended to rural areas?—Yes, and I should like to mention a case which I detected the other day. A horse was being pulled behind an *ekka* with two spavins, and I reported the matter to the *thana*. But the *thana* people told me that they could not take any action unless I could prove that the horse was being ridden or driven. In Lucknow itself, if you walk any evening on the roads, you will find that 50 per cent. of the animals are either lame or injured, and these animals are made to work.

36,260. Is anything in this Province being done for the improvement of goats?—No; we started sheep experiments, but not goat experiments.

36,261. There is no scope for the improvement of the local goats?—I fancy there is, because some of the best goats are to be found in this Province.

36,262. Is there much scope for the improvement of sheep?—There would be if Government laid out the money to carry out experiments. We proved that we could get good wool here of the Merino variety. I had a lot of pure Merino wool which Cawnpore bought from me. I had made an experiment with half-bred Merinos, and all my wool was taken by Cawnpore.

36,263. Did you find that the people wanted the wool of these half-bred Merinos?—Yes, a lot of people began asking us to give them either wool or rams, but I was unable to meet the demand.

36,264. It is merely a question of lack of funds, I take it?—Yes.

36,265. *Mr. Kamat*: You said that between the time of the outbreak of an epidemic and the time the report reached headquarters sometimes even a month elapsed?—Yes.

36,266. Do you not think that that is sufficient to bring the work of the department, so far as the lower subordinates are concerned, into contempt in the rural areas?—The delay is not caused by the Veterinary Assistants; it is caused by the reporting agencies.

36,267. But the villager does not understand which agency is responsible; all he sees and understands is that the treatment has not yet come?—I do not think that the villager takes much interest one way or another, because if he did he would report it himself.

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- 36,268. *The Chairman*: To whom?—To the nearest Veterinary Assistant.
- 36,269. *Mr. Kamat*: Do you think that such a state of affairs should be allowed to proceed like this without any remedy?—No, I think that propaganda work ought to be done. If we had the funds and the staff necessary for the purpose, we could get the villagers to come and report it themselves. There is no other agency except the *patwari* to report.
- 36,270. Which department would carry on this propaganda?—The Veterinary Department. Until we have an adequate staff and propaganda work is taken in hand, the villager will not come forward himself to report.
- 36,271. What I want to ask you is whether it is not in a way justifiable for the members of the District Boards or the rural people to look upon the Veterinary Department with some sort of apathy till such time as this is actually done by your department?—They do not take any interest in their animals.
- 36,272. They do not take interest because they feel the treatment does not come promptly?—No, I do not agree with that. First of all, you have got the superstition of the Indian who does not want to report, and who will not have his animals inoculated.
- 36,273. You do not think that the apathy is due to the delay?—No; it is due to superstitious beliefs in nine cases out of ten. And I know of cases where at first the people said they wanted their animals to be inoculated, and I took the trouble of sending my Veterinary Assistant for the purpose, but as soon as he arrived there the people said they did not want it, and this was obviously due to somebody telling them not to inoculate their animals because something inauspicious would happen.
- 36,274. That is with reference to inoculation, but not with regard to other sorts of treatment?—We are talking about inoculation; in fact most of our diseases are contagious and require inoculation.
- 36,275. About the attitude of the District and Local Boards particularly after the inauguration of the Reforms: have you studied the financial position and the budgets of these District and Local Boards?—Yes.
- 36,276. Is there sufficient money to go round, for roads and communications, education, primary schools, sanitation and so forth?—That is always the excuse; they say they have no funds.
- 36,277. I am not asking if that is the excuse given. I want to know whether you have examined the budgets and found for yourself whether there really was sufficient money to go round for all these purposes?—The only one I have looked up is the budget of my own department.
- 36,278. You have not satisfied yourself whether there is sufficient money in the budgets of the District Boards to meet the various needs of the district?—I have talked matters over with one Chairman of a District Board sometimes, and he has often told me that his Board was hard up, that there was not enough money, and what little there was had to be allotted to more pressing needs.
- 36,279. About this system which prevails in America and South Africa: do you mean to say that the local bodies there have nothing to do with the Veterinary Department?—Nothing whatever; they work purely under the Government, just after the manner of the Board of Agriculture and Fisheries at Home.
- 36,280. When you make that statement are you quite sure that in England the Veterinary Department has nothing to do with the local bodies?—Nothing at all; the veterinary branch of the Board of Agriculture and Fisheries is run by Government.

36,281. But the local bodies have certain Acts to carry through, and surely they must be contributing something towards the veterinary work?—I do not think they contribute. At any rate the Contagious Diseases establishment is run by the Government.

36,282. And your proposal is similar to that, namely that the Government should run the department and the local bodies should contribute?—Yes. I have no objection to the Government contributing the whole money; but I do think that the local bodies ought to contribute something indirectly.

36,283. Do you think that the local bodies should pay the greater portion of the money?—No, I think you should put a levy on District Boards for a certain amount and the Government also should pay a portion.

36,284. So that the major portion of the contribution must come from the local bodies and yet they should have no control?—I do not see why they should. I do not see why a layman should have control over a technical subject at all.

36,285. They should pay the piper and somebody else should call the tune?—They would always have a say in the matter, by protesting against anything which in their opinion was not being done satisfactorily.

36,286. In the matter of primary education this is not the arrangement: it is a dual system?—I object to the dual arrangement, because there is an old saying: "Too many cooks will spoil the broth."

36,287. In the case of primary schools, it is the District Local Boards who see to the opening of schools, and they have control over the teachers; Government simply pay a contribution, and the complaint that you make in the matter of veterinary subordinates is not to be found there with reference to primary school teachers; at any rate, there is very little complaint. If that dual system works in the case of primary schools and the primary school teachers, I wonder why it should not work in the case of the veterinary subordinates?—The Veterinary Department is a technical department for overcoming cattle disease and things like that, but the other is purely an educational matter. Wherever you want education, you will find that the District Board will put their money down for it, but they will not do it for the Veterinary Department.

36,288. But the principle of control over subordinates is common to both. To decide whether a man should be transferred, it makes no difference whether he is in the Veterinary Department or the Education Department?—I find that the trouble is trying to transfer the men. I have always found the men going behind me to the Board, and getting themselves excused from being transferred.

36,289. All over the country, in the case of primary school teachers, the control rests with the District Boards, although there is the Education Department. If that system works in the case of education, why should it not work in the case of veterinary matters?—It does not seem to work.

36,290. *Mr. Pim*: You said that you had discussed with the Chairmen of several District Boards the proposal of transferring the control from the District Boards to Government?—Yes.

36,291. They were quite in favour of it?—Yes.

36,292. Do you think that any of them would have ventured to put forward a proposal of that kind to the Board?—No. This was the view expressed in purely private conversation. I do not think they would bring it forward as a scheme of their own, but if the scheme were put up to them, they might give their opinion in favour of transferring the Veterinary Assistants wholly to us. I do not think that any Board will bring forward such a suggestion themselves.

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36,293. *Professor Gangulee*: Why will they not do it?—They will want to retain as much control as they can. They will not of their own accord put forward such a scheme, but if the proposal were put up to them, they might take it up.

36,294. *Mr. Pim*: Have there been any widespread complaints as to the actual work done by the Veterinary Assistants?—No. You might get one or two cases put up for bad work; that is dealt with departmentally; that is all.

36,295. Apart from the money question, why is it that in a matter which so intimately affects their interests the members of the District Boards, who presumably are the more intelligent men of the district, do not realise the advantages of the department more?—The only thing that I can think of is the apathy on their part to animal diseases.

36,296. They do not believe in the results?—At first, there is prejudice against treating their animals by inoculation and things like that, but directly you can get inoculation done in a village in one or two cases, you can do it in the whole of the village afterwards. It is the initial start-off which is difficult. Now we are getting people coming forward to have their animals inoculated.

36,297. And that prejudice is breaking down now?—Yes; and I think with more Veterinary Assistants and smaller areas to look after you would be able to break it down much more.

36,298. Would there then be any danger of making the administration and control entirely provincial, and of reducing the local control?—No. If you had a bigger staff, it would be stimulated.

36,299. Would you be able to control so many men working in the districts? You know that very often imaginary tour diaries are given?—Yes, but that is the case in every department.

36,300. *Sir Henry Lawrence*: What was the original intention of the post card system? That the *patwaris* should report by post card direct to you?—To the nearest Veterinary Assistant.

36,301. These post cards were issued to the *patwaris*?—Yes, with a stamp on them.

36,302. How was it found to break down?—They did not take any interest in sending the post cards in.

36,303. By what method do they communicate their reports now?—They report direct to the Veterinary Assistant by letter, or they send somebody, or something like that.

36,304. Do you think that a sufficient trial was given to the post card system? You said that it went on for two years. Do you think that two years is a sufficiently long period to give you full experience with regard to the introduction of a new system to a class of man like the *patwaris*?—I do not think so.

36,305. Would you like to re-introduce the system?—The system I would like to have is that the headman of the village should be supplied with post cards on which the names of the various diseases are printed, and when any disease occurs he should put a cross against that disease on the post card and send it to the nearest Veterinary Assistant.

36,306. Is anything being done in that direction?—No.

36,307. Is that for lack of funds?—Yes, and lack of getting it put up.

36,308. Is that not a matter that rests within the discretion of the head of the department?—I have put it up to the local Government. I put on *chaukidars* to do the work, but it was found impracticable.

36,309. Is this system working in any other Province, to your knowledge?—I am not sure about it.

36,310. Do you know what system prevails in other Provinces?—In Bihar and Orissa it is the village *chaukidar*, and he is given rewards if he does it in time.

36,311. Is that found very satisfactory?—More or less; none of them are really satisfactory. The *patwari's* excuse here, if he does not report in time, is that he has other work to do.

36,312. But you are anxious that something should be done to improve it?—Yes.

36,313. What is the exact method that you are now advocating for the improvement?—The one that I would advocate is to get the man to report himself.

36,314. By making it compulsory?—No. It should be as they have it in South Africa. If rinderpest breaks out there, they send for the nearest Veterinary Surgeon; it is done by the owner of the cattle.

36,315. That is owing to the education of the man?—Yes, and knowing the value of his animals.

36,316. Have you ever estimated what is the money loss to the Province from preventible cattle disease?—No.

36,317. Could you make any estimate of the kind?—It could be done if inoculation were made compulsory.

36,318. If you had sufficient staff to deal with contagious disease, what would be the saving in preventible loss?—The saving would be about half the present mortality.

36,319. Could you give us that in rupees? Would you think it out and let us know?—I could let you know.*

36,320. What is the present value of the total cattle population of the province?—From Rs.5 to Rs.300 a head.

36,321. What is the present value of the total cattle population of the Province? Would you work it out and let us know?—Yes.

36,322. What is the expenditure on your department? I want to establish some relation between the two?—It is just over Rs.3 lakhs.

36,323. What do you pay for these doses of serum?—We pay different prices, from 2 annas to 3 annas. Up till last month we had to pay the price of 18 plains doses for one hill dose, but the Government of India has now cut down the price of the hill dose to the price of the plains dose. They are supplying 18 times the amount of serum for the hill tracts for the same price at which we buy a plains dose.

36,324. What happened when you had this outbreak in Garhwal?—The money went for paying for the serum in Garhwal, and the expenditure in the various districts and Garhwal was disproportionate. We had no way of effecting a saving before the Government of India reduced the price of serum.

36,325. When was this done?—Last month. They have done it for the whole year, from the 1st of April to the 31st of March.

36,326. It seems very unsatisfactory from your point of view that you should have to use all your serum in one district and that the other 47 districts should go without it?—It is a serious problem. Garhwal is the purchasing place for all kinds of cattle. It is not only a local problem, it is an All-India problem.

36,327. This is due to the Government of India's interest in the Muktesar Institute?—I should think so.

36,328. *Sir Ganga Ram*: Do you have a veterinary college here?—No.

* With a staff of 428 Assistant Surgeons a calculated saving of Rs.59,96,280 would be effected per year and this figure could be greatly increased by introducing compulsory inoculation and adequate reporting system. 1925 Census: total number 4,14,73,357; value Rs.6,21,11,00,365.

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36,329. Where do you send your students for training?—We have not been sending any students for training for several years because we have been overmanned, but we used to send them to Bengal or Lahore.

36,330. You cannot train Veterinary Assistants yourselves?—No.

36,331. Altogether, how many Veterinary Assistants have you got?—179.

36,332. Your annual requirements would be about 10 per cent.?—For several years we have had no requirements at all. The trouble was that the District Boards cut down the number of their existing staff.

36,333. When the Veterinary Assistants give advice, is there any regulation about what fees they should charge for their private practice?—There is no rule.

36,334. Is there no regulation as to what they should charge, or can they charge anything they like?—I do not think they can charge anything they like.

36,335. It looks like it, if you have no regulation?—There is no Government rule on the subject, but a note has been drawn up by the Veterinary Association showing the minimum amount of fees which a Veterinary Assistant Surgeon may demand.

36,336. You have no travelling dispensaries?—No.

36,337. You have no funds for that?—The District Boards have no funds.

36,338. *Sir Henry Lawrence*: In what cases does the Veterinary Assistant charge fees?—For private work. If you had a horse, and you called him for his treatment out of hospital hours, he would charge you; but for contagious diseases or treatment in the hospital he cannot charge you anything.

36,339. *Sir Ganga Ram*: If the cultivator has a sick cow, is the Veterinary Assistant entitled to any fee for treating that cow?—When he is going through the village, no. The touring Assistant goes from one village to the next. When he is in a village, he calls up the people, talks to them, and asks them if they have got any animal which is sick, and if they have any, he treats it free.

36,340. If any animal gets ill suddenly, has not the cultivator the right to call up the Veterinary Assistant?—No. The fact is that each Assistant may have under his charge an area of 40 square miles, and he cannot go on answering calls for the treatment of sick animals from all over the territory. He has to go from village to village.

36,341. By the time he comes to the village where the cow is sick, the animal may have died. In serious cases, can he not come and give advice?—It is the drawback of the big areas that the men have got to look after.

36,342. You have not got sufficient funds?—No.

36,343. Would you be in favour of introducing a simple course of veterinary science in the Medical College, so that the civil medical officers could do ordinary veterinary treatment themselves?—No.

36,344. Why not?—One might as well suggest that Veterinary Assistants should take a course in human medicine. Each man should stick to his own job. The Sub-Assistant Surgeons would object to doing veterinary work. Moreover, wherever there are civil dispensaries, there are usually veterinary dispensaries.

36,345. That is certainly so in the large towns, but not in the villages?—No.

36,346. The Sub-Assistant Surgeons would be glad to have the extra work?—I do not think they would do it.

36,347. Is it professionally impossible?—The Sub-Assistant Surgeons would not take it up.

36,348. Why do you not make your own serum? Why do you leave it to Muktesar?—It would mean setting up a laboratory to replace Muktesar. It would cost a lot of money.

36,349. *Sir James MacKenna*: Muktesar is in the United Provinces?

36,350. *Sir Ganga Ram*: Yes, but we find the Government of India is making a great deal of money out of the manufacture of serum?—We say it should be provided free.

36,351. *Sir Thomas Middleton*: With reference to the position in Britain to which reference was made a few minutes ago, is the treatment of certain contagious diseases governed by the Contagious Diseases (Animals) Act?—Yes.

36,352. And is it for the supervision of the working of that Act and the treatment of the animals that are affected by the scheduled diseases that the Ministry of Agriculture and Fisheries and local authorities maintain veterinary officers?—Government maintains Veterinary Assistants, but the other bodies have private practitioners who are called in and receive fees for doing the work.

36,353. The great bulk of the diseases with which animals are affected in Britain are not scheduled, and they are treated by ordinary private practitioners?—All contagious diseases of animals are scheduled.

36,354. Non-contagious diseases are not scheduled?—No, the ordinary private practitioner deals with them.

36,355. In the United Provinces your staff has to deal with both classes of disease. They have to cover the work not only of the official Veterinary Surgeons of Great Britain, but of private practitioners as well?—Yes. There is practically no such thing in this Province as a private practitioner.

36,356. What is the total number of Veterinary Assistants available in the United Provinces?—179.

36,357. How many do you think are required to cover the Province reasonably well?—Two in each tahsil.

36,358. That would mean about 300?—Yes, between 300 and 400. There will be one stationary Veterinary Assistant who would help when outbreaks are very bad, and a touring Assistant.

36,359. *Sir Henry Lawrence* asked you to make an estimate of the value of the livestock in the United Provinces. You mentioned that animals might vary from Rs.5 upwards. What are you going to do with the five rupee animals when you come to make your estimate of value? How do you propose to treat them in arriving at your estimate?—You would have to take an average.

36,360. Would you not regard the five rupee animal as better dead?—It would be so in nine cases out of ten.

36,361. Will you add them to your total?—We will have to count them in.

36,362. *Raja Sir Rampal Singh*: You have stated that District Boards lack interest in the work of the Veterinary Department. Do you find the same lack of interest in other spheres of their activity?—I do not think I have ever gone into it.

36,363. You can take it from me that as far as medical treatment in the villages is concerned and as far as education is concerned, they are very keen, and they are gradually introducing new dispensaries and appointing *hakims* and *vaids*. What is the reason why they are so apathetic towards the Veterinary Department?—I think it is because, first of all, it is a young department. The Medical Department and the Agricultural Department have been in existence for very many years. Our department is a young department and the people have not appreciated the benefit of it.

Captain S. G. M. Hickey.

36,364. I think they have not great confidence in the work of your Veterinary Assistant Surgeons?—I would not say that. They have not had sufficient experience of it yet.

36,365. How long is it since this department was started?—About thirty years.

36,366. Do you mean to say that within these thirty years they have not been able to appreciate the work of the Veterinary Assistant Surgeons?—I do not think they have been able to, because there are so few of them. There are areas in the Province not touched by them; in some areas the villagers never come in contact with them.

36,367. Is it your experience that these villagers like to have their own *ahirs* and *salutries* to treat their cattle instead of your Veterinary Assistant Surgeons?—They like to treat them by their own methods, just as they try to treat human beings by their village methods.

36,368. But are they not successful?—Not nearly so successful as the ordinary European treatment.

36,369. Well, the question is difficult in my opinion, because some European gentlemen themselves told me that the treatment given by the *salutries* was better than the treatment of the Veterinary Assistants. Mr. Ford once told me that the *salutries* knew better how to treat horses than the veterinary surgeons did?—I think that is because these men were in the Army and were trained there; they were brought up with horses, and from the point of view of horse knowledge I think they are better qualified than the present Veterinary Assistants; but the latter have more technical knowledge.

36,370. Do your Veterinary Assistants use indigenous medicines?—They use country drugs, yes. We supply them with English drugs and with country drugs bought in the ordinary bazaar; sulphur, ammonium chloride, borax, and so on.

36,371. I will tell you my own experience about this. Once I had occasion to call in a Veterinary Assistant to treat a she-buffalo of mine, and the prescription that was given to me cost me Rs.32. I had to get it from Lucknow. Afterwards I called an *ahir*, and he cured it by giving it some leaves and other things, which cost me only a pice. After all, it will be very difficult for the Government to provide every small circle with Veterinary Surgeons. Would it not be better if some training were given to our village people, so that they could treat the village cattle and cure all sorts of common, non-contagious diseases?—I think a lot could be done by propaganda work among the villagers, telling them how to give simple treatments, but with most villagers even if you give them simple treatments, they will not treat their animals.

36,372. *Professor Gangulee*: Are there any private practitioners in this Province?—There is one in Meerut and I think there is one in Allahabad.

36,373. Have they got a good practice?—The man in Meerut has a good practice.

36,374. I see the number of inoculations is increasing?—Yes.

36,375. So superstition is becoming less of a bar there?—Directly a villager sees the result of inoculation is good, he will be converted to the method.

36,376. There has been a distinct increase in the number done in recent years?—Yes, and this year we could have done still more if we had had the serum.

36,377. *Sir James MacKenna*: It is distressing to hear any suggestion of shortage of serum, especially in the Province where it is made. Was that due to bad budgeting?—No. It was due to an outbreak of virulent disease in Garhwal, where we had to give 13 times the ordinary dosage.

36,378. Could you not have got a special grant?—We did, but a period elapsed before it could be renewed.

36,379. *The Chairman*: How long?—Two months.

36,380. *Sir James MacKenna*: Have you ever known a case of the budget allotment for serum not being expended?—Yes, if only mild outbreaks occur.

36,381. Could you not buy serum and send it to a small storage centre to be kept in cold storage? It seems to me it would be an absurd extravagance to manufacture serum in the United Provinces?—It would mean overlapping of work.

36,382. Would not the storage of serum be fairly simple? We did it in Burma?—It could be done.

36,383. It seems to me to be rather a Gilbertian position, and the United Provinces is the last Province in which I should expect to find any storage difficulty?—It is purely a money matter. We are going to look into the question of storing at different centres; at present I can only store it here.

36,384. Is that cold storage?—No, not cold storage; only pit storage.

36,385. *Sir Ganga Ram*: What is the system now of castrating bulls? Is it done by a surgical operation or by the old method?—It is done by the Italian method; there is no bleeding. Mulling is still being done by the villagers; I saw a case the other day where an accident occurred while the mulling was being done.

36,386. The villagers are not yet convinced of the convenience of the new system?—No.

36,387. *The Chairman*: Are you responsible for the propaganda directed towards popularising poultry breeding in the Province?—I am President of the Association.

36,388. Does it come within your departmental responsibilities?—The budget comes through me.

(The witness withdrew.)

Mrs. A. K. FAWKES, Secretary, the United Provinces Poultry Association.

Memorandum on the Poultry Industry of India.

How the industry is conducted.—The poultry industry of India is carried out between the peasant producer on the one hand and the purchasing consumer on the other by means of agents or professional dealers. The entire organisation is unofficial and up to the present time the Government of India has had no concern or interest in the industry.

Species of poultry found in India.—India, Burma and Ceylon are presumed to have given to the World the genus Fowl and the earliest historians allude to the species going Eastwards to China in about B.C.-1400 and Westwards somewhere about R.C.-500 or B.C.-600, but the origin is lost in antiquity. The ancestors of the species, the wild Jungle Fowl (*Gallus Bankiva*), and the pure-breed *aseel* or Indian Game are still to be found in the jungles and breeding areas of this land. At the present day there are four divisions of fowls prevalent in India; they are as follows:—
(1) The division whose type mostly resembles the Jungle Fowl, these birds carry the Jungle Fowl colouring and shape, are quick maturing, high flying,

rarely exceeding 3 to 3½ lbs. in weight, and are poor producers. This resemblance is noticed to be stronger in the villages close to the habitations of the Jungle Fowl. (2) The type most closely resembling the Indian Game, being heavier in weight, slow maturing, tight feathered, useful as table birds but poor layers. The pure-bred game is rare and only found in certain breeds' hands. Indian Princes and others keep them mostly for cock-fighting purposes. They are not obtainable outside these circles. The Chittagong fowl, a native of that district, is a valuable pure breed of India well worth attention. (3) The third type of fowl shows a strong admixture of foreign blood. Sometimes the influence is from further East, the Chinese type predominating, but more often Western breeds of fowls show their characteristics. These types of fowls are more of a commercial asset to the country, as although very mongrel they are of better size and are better producers than either of the types previously mentioned. The Western influence on the third type of fowl is of course due to the many birds brought out by British people to India, which eventually spread their progeny throughout the neighbourhoods. Unfortunately the Indian poultry breeder is as a rule entirely ignorant and careless as regards the breeding of his fowls, and only education can alter this. (4) Various types not included in the above classifications may be said to form the fourth division of fowls, one variety of which is perhaps worth mentioning in that it has the peculiar characteristic of being black skinned and black in flesh, but it is of little commercial value.

As a general rule, it may safely be said that the entire species of domestic fowls, etc., are much smaller than those found in the Western countries. The average weight of an Indian chicken when dressed for table rarely exceeds 3 to 4 lbs., and the hen's egg averages 1½ to 1¾ oz.

Approximate production.—As no census has ever been taken of the number of head of poultry in India, it is impossible to give any accurate data on this point. Taking, however, the population of India we find that there are some 316 millions of people, of which 68½ millions are Mahommedans and 4½ millions are Christians, the remainder being Hindus, Sikhs, Jains and other sects. The first two mentioned religious divisions are meat eaters, and therefore probable consumers of poultry products. The higher caste Hindus on the other hand are vegetarians, and have no interest in the industry; on the contrary they look upon poultry as unclean, though education is changing this attitude as will be shown later on in our report. The lowest castes of Hindus, however, with the poorer classes of Mahommedans form what we may term the actual poultry breeders of the country. They are mostly too poor to eat what they grow, but sell the products to dealers. The Christian population are undoubtedly the chief purchasers of poultry products. If we assume, therefore, that half the Christian population plus 5 per cent. of the Mahommedan population consume on an average say one egg per head per diem we may have some basis on which to estimate how many head of fowls there are likely to be in the country. The number of consumers works out at a round figure of 5½ millions, and knowing as we do that the average Indian hen produces somewhere in the region of 50 eggs per annum we arrive at a hen population of not less than 33½ to 40 millions. Adding to this the probable number of male birds and young chickens, our calculations being based on observations made on a small scale, we conclude that somewhere about four to five hundred million fowls is a likely total. If we allow another hundred million to cover the possible head of geese, ducks, turkeys, pigeons and guineafowls we have a grand total of about six hundred million birds. Again, basing our calculations on the fact that each peasant farms from six to ten head of fowls, for we find that conditions point to these figures, we arrive at the conclusion that some 50 million persons participate in this cottage industry.

Methods of marketing.—The organisation for the marketing of eggs and fowls is in the hands of professional dealers who make house to house collections and transport the produce by rail, river or road to the market towns. Many of the circles of egg collection are very extensive, eggs coming from a 200 mile radius and more to central markets. The railways encourage the transport of eggs by charging only half parcel rates on such consignments, whereas they discourage the transport of live fowls by charging very high freightage. Eggs are sold by numbers and not by weight, they are packed in baskets or large earthenware vessels, and in lieu of the Western label notifying that care should be exercised in transport an egg shell denotes the perishability of the contents. The prices realised for poultry products vary in different parts of the country. To take a few examples: An investigation into market conditions in Lucknow as regards eggs shows winter sales from November to February amounting to some 5,000 eggs per day, realising a retail price of from 9 to 12 annas per dozen. During the hot weather months the sales are halved and the prices fluctuate between 7 and 9 annas per dozen. The villagers receive but half the amount realised by the retail merchants, and in many cases even less. A report from Bombay gives the sales of baskets of 650 eggs realising from Rs.16 to Rs.32. The villager who supplies these eggs does not receive more than about 2 as. per dozen, if as much. A report from Madras City itself shows that eggs in large quantities can be brought from villages at as low prices as Rs.3 per thousand, but the retail rates are 6 as. per dozen. It looks as if the poor ryot is largely exploited by the professional egg merchant in most cases.

No recognised standard for size of egg exists, but the larger egg commands a slightly better price. The average weight of an Indian egg is 45 grams, or 22 to the kilo, but in the United Provinces and other areas where some improvement in poultry breeding has been done, the egg may reach 52.6 grams, or 19 to the kilo.

Table fowls are sold by piece, though size of birds controls the price. Roasting fowls in various markets fetch from 12as. to Re.1-3-0 according to demand, and curry fowls or small chicken fetch 8as. to Re.1. The village producer gets about half these rates.

Chittagong district is an area which produces vast numbers of eggs and fowls, and supplies go from Chittagong to Burma as well as to large cities like Calcutta and Darjeeling, and many ships provision themselves with stocks of eggs and fowls brought from this district.

Much might be done to improve the economic condition of the peasant producer of poultry if he were assisted to keep better stock and by means of co-operation helped to secure a fair price for his produce instead of being, as he is now, exploited by the professional dealer.

The by-products of poultry, such as feathers, fertilisers, gizzard linings as a source of commercial pepsin, egg shells as a source of powdered calcium carbonate are all wasted in this country, and the vast potentialities of poultry production unrecognised.

As the standard of living improves in India so will the demand increase for what other nations have proved to be, next to milk and bread, the most valuable food in existence.

The value of all poultry products has gone up 50 per cent. during the last twenty years.

Conditions under which the Poultry Industry exists.—The poultry of India, with certain exceptions, are, as has been previously pointed out, small in weight and size, and indifferent producers of small eggs, but the reason for this is not difficult to see. The poultry keepers of India are poor and ignorant men and they make no attempt to select or breed their poultry on any system. The birds interbreed as they please, and roam the villages scavenging in the drains and rubbish heaps of the vicinity for their food.

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An occasional handful of grain is all they can hope for, and they depend, like the fowls of the air, on what they can find for themselves. Unlike the fowls of the air, however, they are susceptible to many diseases, and often whole flocks are decimated by visitations of cholera, chicken pox, and the fever caused by the invasion of ticks. This is augmented by the insanitary conditions under which they are kept. In spite of these hard conditions many survive, and the indigenous fowl is on the whole a hardy bird and will endure very adverse circumstances. We have only to witness the cruelty they undergo in transit to market, or awaiting sale in the market places, where they are densely crowded in small baskets, often left in the sun without food or water for many hours, to realise what they are capable of living through. Even under these conditions they help to pay the rent of the peasant and contribute in a very valuable way towards the feeding of the community. How much more productive the poultry of India could be is easily imagined, and what a valuable contribution could be made to the world's production of food if India's vast acreages were put to fuller use, is obvious.

Poultry Breeding in the United Provinces.—For the past twenty years small efforts have been made by keen poultry fanciers to effect some improvement in Indian Poultry and an unofficial body styling themselves the Indian Poultry Club organised originally by Colonel Tyrrell, R.A., have been largely instrumental in interesting the public in pure bred fowls. They have done and are doing a great deal of useful work in this direction and hold important Poultry Exhibitions annually in Calcutta and other parts of the country. They also publish a useful journal called the Indian Poultry Gazette. They are much hampered by lack of proper funds. The present Hon. Sec., Mr. A. E. Slater, is doing valuable poultry work among the depressed classes of Etah district, United Provinces.

As an outcome of the Club's efforts, Sir Harcourt Butler in 1919 asked the Government of the United Provinces to finance a small scheme which would have as its object the improvement of poultry in the United Provinces. This being sanctioned, Government asked me to come out from England to take up the post of Poultry Expert, as in addition to an English training at Wye Agricultural College I had had experience of Indian conditions having acted as Hon. Sec. of the Indian Poultry Club in former years. An Association was formed for the Province, Sir Harcourt Butler himself guiding its constitution and I was appointed Secretary. I was asked to estimate for and draw up a scheme to promote the interest of poultry farming in the United Provinces. Briefly my scheme was as follows:— (1) To popularise the breeding of good fowls by illustrated lectures at all the principal centres of the Province. (2) To organise poultry shows at all agricultural fairs in the Province. (3) By the establishment of two poultry farms, one at Lucknow and one at Naini Tal, to demonstrate how poultry farming should be done and also to provide pure bred stock for distribution throughout the Province.

This scheme was sanctioned by Government and an initial grant of Rs.40,620 was given to the Association to enable it to carry out the programme. The cost of building and stocking both these farms amounted to some Rs.25,703. The cost was enhanced owing to the higher rates for labour and building materials prevailing at the time.

My staff consisted of a lady assistant in charge of the Lucknow farm, and the part services of another lady at the Naini Tal farm, and one office clerk with two peons, excluding the menial staff employed on the farms.

During the years 1920 to 1922 the policy of the Association was to assist the poorer classes to obtain good poultry and with this object in view we sold settings of eggs at a moderate price. We also co-operated with

Mr. Slater, a missionary of Etah district, United Provinces. This missionary was devoting his time to raising the status of some 15,000 of the lowest castes by teaching them to raise poultry. Under his supervision we gave large numbers of male birds to be crossed with village hens. He also, from his Mission farm gave out quantities of eggs and birds free of cost, and the result of our combined efforts to-day is, that there is a large self-supporting community in Etah growing extensive stocks of good poultry and last February one thousand birds were put up for my inspection at the Etah Poultry Show. The Association carried out this policy of distributing good stock in other centres also; for instance through the Court of Warda manager of Kantit Estate in Mirzapur district and through the district Boards of Moradabad and Saharanpur. In some cases we were successful but we realised that unless the work was supervised by reliable and knowledgeable people the results were indifferent.

From 1922 onwards, owing to various causes, the Association was directed to cut down its budget demands and to put the work on to a self-supporting basis. We also found that other poultry farms were starting business in the United Provinces and the feeling was that a Government farm should not sell at lower rates to the public than other farms were doing. In order to put the farm on a business footing, we amalgamated the Naini Tal farm with the Lucknow farm under one European Manager on a salary of Rs.300 per month. This necessitated the cessation of the free distribution of stock, etc., though we continued to do what we could in this direction. Much experimental work that I had planned had to be curtailed. However, year by year the farm grew in popularity and the interest aroused in poultry farming spread to all parts of India. Our stock was sought after from all parts and we cannot in any measure fulfil the orders we receive. There is ample scope for a large extension if the capital were available.

My correspondence has become a very heavy part of the work and letters asking for advice come from all parts of the country. The number of letters replied to by me personally during 1925-26 was well over 4,000. My office staff consists of one man and he has to carry out the duties of accountant and clerk for the work of both the farm and office. The responsible post of Farm Manager is at present held by an Indian, a Brahmin by caste, who has been in the Association since its formation, having previously been in charge of the clerical work. He is not very experienced, and the appointment was made as a temporary measure with a view to testing the capabilities of an Indian in work of this kind.

Experimental work.—Experimental work has been done at the Lucknow Poultry farm under the following heads:—(1) Pure bred imported stock have been kept successfully, living through the tropical conditions of the plains. They have produced good progeny, and their egg production, especially through the winter season, at a time of the year when eggs are of most commercial value, is equal to if not above the average of eggs laid by fowls in temperate climates. The egg production of pedigree laying stock is at least treble the amount laid by Indian hens. (2) Pure bred male birds, bred for egg production, have been crossed with village hens. The progeny resulting from these matings have produced double the amount of eggs of the original mothers and the size of eggs has increased from $1\frac{1}{4}$ oz. to $1\frac{1}{2}$ and $1\frac{3}{4}$ oz. each egg. (3) Feeding tests have been made and Indian foodstuffs proved to be economical and valuable for egg production. (4) Poultry diseases studied as far as possible and kept under control by sanitary measures. The invasions of ticks have been controlled, cholera and chicken pox and numerous other diseases investigated and kept at bay, and the experience gained has been published in books and bulletins. We have co-operated with the Imperial Bacteriologist and our United Provinces

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Veterinary staff and are very grateful for the interest they have taken and the help given. They wish to do more but are hampered by lack of staff and means.

Our classes for students are a great feature of our work and are generally attended all the year round. During the cold season I lecture to the students each day when I am in headquarters. I am handicapped for want of a staff, as I have the entire Province to tour, besides the office work and all that it entails, and a great amount of my time is spent on the Farm supervising the work of the manager. The students are handicapped for want of proper accommodation and we badly need a hostel; in fact a training college well-organised on modern lines is the only satisfactory solution to the problem of meeting the demands of Indians for tuition in poultry keeping.

We give short courses for six weeks, but most of the students stay on for three to six months. Sixty students have been trained. We hold examinations at the end of each course and issue certificates if they obtain over 60 per cent. of the total marks; if they obtain over 75 per cent. they pass out in the first division. We charge only Rs. 25 for a six weeks' course for United Provinces students, and a slightly increased rate to pupils from other provinces.

Co-operation and assistance given to other Departments and individuals.—It would be impossible to give a full account of the work we have done for the public but the following brief memo. will show that every province of India has obtained advice and help from us through its official department.

North-West Frontier Province.—We have stocked and started a poultry farm at Parachinar for Major Noel, Political Agent, and trained a Pathan to manage the farm. We have advised the Director of Agriculture also on poultry matters and supplied him with poultry and feeding stuffs.

Punjab.—In 1922 we advised the Hon'ble Mr. Cassels of the Punjab Government regarding a scheme to improve the poultry of the Province. Owing to lack of funds, this was not carried out. The Agricultural College at Lyallpur has received advice and stock from us. We have corresponded with the Director of Agriculture, Punjab, on various matters, and in February 1926 I gave a poultry demonstration and lecture at Gurgaon during the Agricultural Fair at the request of the Deputy Commissioner.

Bombay.—We have co-operated with Dr. Mann, Director of Agriculture, in the establishing of the first Government poultry farm in Bombay. We have sent one of our trained students to manage the farm and have stocked the same with pedigree birds and full equipment. We have advised the Livestock Expert fully on all poultry matters especially as regards the cost of holding an egg laying test on the lines of that held annually by the United Provinces Poultry Association.

Bihar and Orissa.—We have held several poultry demonstrations at the request of the Agricultural Department. In 1924 at Sonapur Fair we attracted much interest and many people in the Province expressed a desire to have a Government Farm on similar lines to ours. We have trained several men in poultry farming for the Bihar co-operative society, and we assisted last year at the opening of a farm by a Brahmin gentleman at Bhagalpur, also supplying a trained manager and pedigree stock.

Bengal.—We assist annually at the Calcutta Poultry Exhibition and co-operate with the Agricultural Department. We have trained an officer of the department to manage a poultry farm in connection with the Dacca Agricultural College, and supplied stock for same. We have also trained a student to manage the poultry farm at Bolpur in connection with

Dr. Rabindranath Tagore's village reconstruction work at Shantiniketan. We have also, at the request of enthusiastic Indian gentlemen residents in Calcutta, put up a scheme for a Bengal Government Poultry Farm to the Minister of Agriculture, Sir H. Stephenson. This scheme may soon materialise.

Madras.—We have advised the Agricultural Department on several occasions. We have also trained two men sent us by the National Council of the Y.M.C.A. and these men are doing valuable work in the Rural Reconstruction Institute at Coimbatore in teaching poultry farming.

Central Provinces.—One of our Brahmin students from the Central Provinces has opened a farm near Nagpur. We have advised the Agricultural Department from time to time.

Assam.—Have advised the Agricultural Department on poultry matters, and there is a keen desire in Assam to promote the industry if funds permit.

Burma.—We have advised the Agricultural Department and co-operated in sending stock to the Rangoon Poultry Show, and we have published a book on poultry farming in the Burmese language.

Indian States.—Kashmir, Bhopal, Gwalior, Hyderabad, Datia, Dhar, Nepal, Kapurthala, have all received either personal visits or letters of advice and help, as well as pedigree stock from our farms.

United Provinces.—Naturally the greater part of the Association's work has been done in the United Provinces. In co-operation with the Board of Revenue, we have started small poultry farms on various estates in the Province. Some of these are successful while others have failed, generally for lack of proper supervision. In co-operation with District Boards also small farms have been started and the birds sent to such centres have done a lot of good to improve the local fowls. We also organise poultry shows at most district fairs, at the request of the District Board authorities. We have assisted the Cawnpore Agricultural College to organise a poultry farm, and one of their officers is at present training under us. The Criminal Tribes Settlements in two areas have also started small poultry farms with our help. We are working in with the Girl Guides movement, hoping to interest the future generation. Missionary schools and colleges have also sought our aid. A great many private poultry farms have been started in the Province, but until some reorganisation of market conditions takes place they will find it difficult to get satisfactory prices for their goods. Pedigree breeders, however, make a good sum by selling eggs and birds of pure-bred varieties.

Last but not least, the Imperial Agricultural Department has been most helpful in our work and has published every year reports of our Egg Laying Tests and other information we have furnished. Under their ægis we read a paper on Indian Poultry at the recent Science Congress in Bombay, and the Agricultural Adviser has at all times given me his help and co-operation. As before mentioned we have received great help from the Imperial Laboratory at Muktesar, both with regard to research work on disease and also practically, for, in co-operation with the Imperial Bacteriologist we were able to manufacture a very fine sample of dried eggs from ordinary country eggs. This product is greatly in demand in the Western world, and would make a valuable export industry if the trade were encouraged and organised. As regards the general public, we have done our best to reply to every applicant. We only regret that the whole work is dependent on one person.

Lastly.—We are in co-operation, through the International Association of Poultry Instructors and Investigators, with workers in poultry husbandry all over the world, and receive information from the International Institute at Rome through the "International Review." As Member of Council for

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India of the above Association, I hope to attend the World's Poultry Congress to be held at Ottawa next year and report on the small beginnings we have made in our efforts to improve the poultry conditions of this vast Empire.

Obstacles to Poultry Farming in India.—The chief hindrance to poultry farming is due to the fact that the Hindu population of India, with the exception of the lower castes, is not interested in the industry, in fact, it objects to it. This difficulty can be overcome in time by education and by the raising of the industry from the sweepers' task to the level of a specialised profession. I have had no less than fifteen high caste Brahmin students, and not a few have started farms of their own. At the Lucknow farm, no caste distinction is recognised, we all work together as equals. The objection to eggs as food has been lessened, on my explaining to orthodox Hindus that infertile eggs containing no germ of life are sold from the Farm for eating purposes and that the fertile eggs are used entirely for reproduction purposes. A simple fact like this, broadcasted all over the country, gives a different outlook on everyday things. As the standard of living improves, so the demand from the meat-eating population will become increased for eggs and poultry, and future generations will consume far more of these products than former generations. Besides, the interests of the minorities (and the large numbers of peasants concerned make no small figure) demand attention from those in power.

The ignorance and poverty of peasants themselves and their lack of kindness towards animals as a whole are a formidable obstacle. We Europeans from childhood are taught to look on animals as playmates and friends, the outlook is different in the East. To remedy this every primary school should be taught to value and care for animals and have some simple project, such as a small poultry farm, included in their school education. I should also like to see agricultural propaganda work carried out by means of cinema films and illustrated talks to villagers. The cinema apparatus could be taken on lorries all over the country. With this end in view we have co-operated with the G.I.P. Railway in producing an educational film on poultry farming in India, and it is their intention to carry this film on a special carriage and show it throughout the country through which their line runs.

The susceptibility of poultry to diseases and difficult climatic conditions is another obstacle to progress. These difficulties can be met by scientific research and using our own experience and knowledge to evolve a race of fowls that will combine increased production with greater immunity from tropical diseases. Such a race I hope may be evolved in the future by taking the best the East can produce and mating it to Western high-producing stock.

The lack of good pedigree stock in the country is another handicap. This can be remedied by establishing poultry breeding areas in every Province. The fowl reproduces so quickly that five years would see the experiment completed. Another source of supply, which is at present being wasted and which could be utilised, is the large stocks of pure-bred males bred by Europeans, Anglo-Indians and Indian fanciers. All poultry farmers find they have a surplus of males, and these, finding no market at remunerative prices are killed off when quite young. These cockerels would do untold good if distributed amongst the villages for improving the local breeds. To breed with the improvement of stock in view would be a valuable hobby for the retired domiciled community to undertake. Owing to his being exploited by the dealers, the peasant gets a very small profit from poultry keeping. This reacts on the educated poultry farmer who grows better fowls and eggs. He has to compete with the bazaar article and finds it difficult to make his farm pay. If, by co-operation, the villager could secure fair prices he would be stimulated to increased production. There may even now be a surplus production of eggs that keeps prices low, if this is so I would suggest that

factories for the manufacture of dried eggs be encouraged. This industry is a very large one and in China brings in millions of pounds of revenue to the country. England alone spends 2½ millions sterling on Chinese eggs. The Western market will absorb an unlimited quantity of this product. With this end in view, either at once or in the near future the poultry industry of India might be encouraged so that within a few years' time it would bring in a very substantial increase of revenue.

Lastly, in all probability, on account of the above-named obstacles, the Government of India have not considered the poultry industry at all, but until they do there is little chance of any improvement.

Additional note on the development of poultry breeding in the United Provinces.

Efforts made by the Government of the United Provinces as regards poultry breeding.—In amplification of the report given above, it may be pointed out that the United Provinces Government have for the past six years given a substantial grant-in-aid of poultry breeding through the Civil Veterinary Department budget, averaging some Rs.20,000 per annum not including some non-recurring sums given to both the United Provinces Poultry Association and the Etah Mission Farm.

The major portion of this recurring grant is given to the United Provinces Poultry Association for the propaganda of poultry breeding in the Province, and they by the means of a well-equipped farm, training of Indian students in poultry husbandry, propaganda work such as illustrated lectures, visits to farms and an advisory correspondence bureau, &c., carry out this purpose of the Government.

The United Provinces Poultry Association staff consists of a Secretary on Rs.700 per month, a Farm Manager on Rs.300 per month and a clerk on Rs.125 per month.

Poultry shows for Indian and Anglo-Indian exhibitors are organised by the Secretary, United Provinces Poultry Association, at most of the agricultural fairs in the Province every year and substantial prizes in money or gifts of good breeding stock are given out to selected exhibitors.

Cross breeding with pure bred birds is largely in evidence in this Province, near all bazaars of our principal cities fair sized poultry are to be seen, and the country egg in this part of India is decidedly larger than the egg produced in other Provinces in India.

The United Provinces Government also contribute not less than Rs.1500 annually to assist the village poultry industry in Etah district conducted by Mr. A. E. Slater, an American Missionary.

It is an unique work and here the poultry industry is entirely developed for the benefit of the depressed classes, with most excellent results as regards the improved status of the peasants who have taken up the industry. If this work were done under supervision on a larger scale it should prove of great value in other districts.

The work has proved that pedigree Leghorns and Minorcas can become inured to village conditions and bring in good returns to the peasants keeping them.

The United Provinces Poultry Association do valuable work in educating Indians in poultry husbandry, some 76 students up to date have passed through our hands. The men when trained either conduct their own poultry farms or take posts as managers. A few have not made good and left the industry, but on the whole the results are promising and training is in demand from all parts of India, especially from Bengal and chiefly from amongst Brahmins and Mahommedans. We give preferential terms to our provincial people.

Being single handed, the Secretary finds it most difficult to carry out all the different activities efficiently.

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There is a very large demand from both within the Provinces and from outside for advice and assistance. Over 4,000 letters are written by the Secretary each year.

A few poultry farms have been established by the help of the United Provinces Poultry Association in various Courts of Wards estates in this Province, some have failed for lack of proper supervision and enthusiasm on the part of those in charge, others have done good work.

Most of these farms have come into being as a result of the propaganda work of the United Provinces Poultry Association, and as they continue to flourish, it is presumed they do good business, chiefly in the sales of breeding stock and eggs of pure-bred birds, for setting.

The table egg is provided by the country fowl and it is difficult for better class eggs to fetch higher prices in competition with the bazar egg and this is a grievance that is affecting the improved type of poultry farmer.

It would seem that India has more than a sufficiency of eggs for her own consumption and that an outside market should be sought for the bazar egg, so as to enable the better sized egg and fowl to find a local remunerative market.

Breeds chosen for experiment.—Experimental work has not been done to any great extent.

The United Provinces Poultry Association's farm was originally intended to carry out breeding experiments, but owing to financial stringency I was instructed by Government to make a commercial undertaking of the farm. Hence, as there is no demand for cross-bred stock at a remunerative price, the farm keeps only pure varieties, though a few experiments with crossing Chittagong and Rhode Island Reds, Brown Leghorns with country fowls and White Leghorns with Basra fowls are going on.

In Mr. Slater's village work he reports the Leghorn and Minorcas as the best birds for the villager to keep, owing to their active foraging propensities and their small consumption of food.

In giving out breeds at poultry shows to villagers, I find the heavy birds are much sought after, but they scarcely ever survive a hot season in the plains, the intense heat of the United Provinces' climate kills off the heavy varieties unless they are given special shade and shelter from the west winds and burning sun.

During the winter season from November to March, any good breed however will live, if fed and cared for, and will reproduce itself before death overtakes it in the hot season. The progeny of such matings are much more likely to survive, being more acclimatised.

In the Mirzapur and other districts very useful cross-bred stock has been bred during the cold season from birds given out from the United Provinces Poultry Association farm.

The following breeds have proved most useful on the Lucknow farm:—

Leghorns, all varieties.

Minorcas.

Rhode Island Reds.

Australian Black Orpingtons imported from Australia.

Light Sussex.

White Wyandottes.

All these breeds are bred most successfully and give abundance of eggs in the cold and rainy seasons and healthy progeny.

An egg-laying test is held at the United Provinces Poultry Association's farm each winter season, and entries from Australia, England, and all parts of India come in. Pullets are tested for production in single pens, and the winter egg records achieved equal records put up at other laying tests in other parts of the world.

We are unable to conduct a twelve months' test in this climate of the plains, but there is no doubt about the wonderful production pedigreed birds can put up in India, if fed and cared for correctly.

A full year's test is required, but money is not available at present for the purpose.

Indian feedstuffs are admirable for poultry and the raising of chickens very easily carried out during the cold season.

Conditions are more favourable than in Europe for this branch of the industry.

Disease is controllable, but the prevailing ignorance is enormous and lakhs of poultry die annually for want of knowledge in poultry-raising on the part of the owners.

Experimental work has been done in a general way only since the inception of the United Provinces Poultry Association in 1920.

There is urgent experimental work to be done if funds could be given.

Artificial incubation of eggs has been successfully carried out by me on the United Provinces Poultry Association farm, and an incubator made by us put on the market. We never use hens for setting purposes.

Preservation of eggs in water glass is highly satisfactory if due care is taken to keep the eggs constantly immersed, as the solution dries rapidly. This process, if taught to villagers would assist considerably in preserving their surplus eggs in the plentiful season.

Experiments versus disease.—The chief obstacle to poultry farming in the United Provinces is found in the attacks of parasites called ticks. We have used injections of soamin as an antidote to fowls so affected with complete success. We teach all we can with regard to this scourge, and have issued many leaflets and published books regarding the treatment of poultry diseases in English and the vernacular, but there is still a great deal to be done, and we have barely touched the fringe of this great problem. The means placed at our disposal are so small, and we have so small a staff.

Captain Hickey, Veterinary Adviser to the United Provinces Government is President of our Association and his technical knowledge and help is of great value to us.

Marketing—Table birds.—There is a very large market for the ordinary fowl and the Province is well situated as regards facilities for marketing.

The hill stations of Mussoorie and Naini Tal absorb large quantities of produce and the cantonments and big cities of the plains demand large supplies all the cold season.

Prices vary from Rs.1 to Rs.1-8 per bird and very fair poultry is to be found in the markets at the present time for the higher prices. Of course, compared to European table poultry the birds are small and flavourless, but matters are improving and better fowls all round exist, when we compare market conditions of twenty years ago. We attribute this to the increasing numbers of pure bred fowls that gradually find their way to the people, and if more breeding operations were carried out in centres of poultry production, still better results would accrue. There is no doubt that there is a lot of under-sized stock about and in country districts the eggs and fowls are still very small; it is near cities where European fowls are kept, that the improvement is most marked.

The method of packing table fowls for market is primitive and revoltingly cruel. The railway freights being so high, the people are forced to crowd numbers of birds in small low baskets.

The result is a great amount of suffering to the birds and death to a good many, especially as birds have to travel in hot luggage vans, no provision being made in India by the railways for the transport of poultry to market, in suitable ventilated wagons.

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The table fowl is sold alive in every case, no trade is done in cleaned and trussed fowls for table. If cold storage wagons and like facilities become available, no doubt this trade will change its customs accordingly.

Eggs.—The Market for eggs is very great and the chief centres are Lucknow, Rampur, Saharanpur, Aligarh, Meerut and Allahabad.

Mirzapur in the south of the Province grows large quantities of fowls, turkeys and guinea fowl and eggs for the Calcutta market, and some cross breeding work done by us through the Court of Wards farm in the Kantit Estate (Mirzapur district) has been successful.

Lucknow is a large collecting centre for eggs both for its own use and for the supply of Naini Tal. A rough estimate gives some 30,000 eggs per day as marketed in the flush season, November to March.

Five thousand eggs per day come by rail alone to Lucknow at this time.

The method of packing is ingenious.

Some thousand eggs without any packing material are carefully packed in layers in an ordinary country basket. Each egg dovetails into the next egg and the whole mass are tightly and cleverly wedged together.

As an indication to the railway transporting agencies, an empty egg shell is tied on the top of the basket and the consignment in most cases meets with very little breakage *en route*.

These baskets are non-returnable and form a cheap and efficient method of packing within the means of the senders.

From Saharanpur great quantities of eggs are sent to Mussoorie and Chakrata, one dealer reported to me he despatched 5,000 eggs daily.

In the summer season, the eggs are not fresh and methods of storage and preservation would be useful if taught to the people. A considerable amount of money is lost through the imperfect and slow methods of marketing.

Poultry breeders keeping pure breeds complain that they cannot get a really good price for their large eggs except by private sales.

Indian marketing of poultry products is controlled by the *khansama* or cook who is the purchaser on the one hand, and the middleman who is the seller on the other hand. Commission on transactions is usual, and unless this commission is forthcoming liberal business is not done. These conditions make it difficult for poultry producers to deal direct with the public.

Some scheme of marketing should be adopted through co-operative channels to bring the producer directly in touch with the customer.

If this were done, poultry farming would bring great relief to the peasant producer, as a subsidiary industry. Under the present system the middleman has most to gain.

There is no doubt that poultry breeding is very common in this Province among the Mohammedans, and low caste Hindu people and probably is more done than in any other Province of India except perhaps in Madras.

On the other hand the educated people of the Province are not interested in the betterment of this industry except in a few cases, and it has been uphill work to make any headway.

The Hindus are more orthodox and object to poultry on principle, whereas in Bengal and other parts of India many Brahmins even do not object to the industry.

We hope by means of increased propoganda work to overcome this prejudice and with this end in view have obtained by the kindness of the East India Railway a demonstration railway car fitted up as a model poultry farm wherewith to tour the Province. This car is meeting with good reception wherever it goes. We also have co-operated with the Great Indian Peninsula Railway in making a very instructive cinema film, which we are showing to the public on every possible occasion.

We anticipate far more demands on our resources and we only hope the Government of the United Provinces will back up our efforts with increased support both of money and men.

In the financial year of 1920-21, the gross receipts of the United Provinces Poultry Association farm amounted to Rs.2286-2-0, and in the year 1925-26 they amount to Rs.11,267-7-11, which shows an increase of some Rs.9,000. But it must be borne in mind that the farm is now conducted on a self-supporting basis for supplying stock birds and setting eggs to the public, and there is now scarcely any experimental work carried out.

Mr. Slater's village work also is successful as far as it goes but is also cramped owing to lack of adequate financial support.

Neighbouring Indian States are taking an interest in our efforts to promote poultry breeding.

We have trained a student from the Datia State and another man is now being sent us, in order that their poultry farm at Datia may be more efficient. I have personally visited Datia and given advice.

The Bhopal State has also sent us a student and I have personally advised the Begum and lectured in her State.

Gwalior State has also been in correspondence with us and sought our advice.

Nepal has sent one student to our training class.

We have supplied stock to the Kapurtala State also.

Many other Indian States too numerous to mention and further afield have also availed themselves of our technical advice and training and in several instances started State poultry farms.

Note on the Dried Egg Industry.

After several years of careful investigation into the dried egg industry as carried out at the present time in China and in California, I have come to the conclusion, in consultation with business men and agricultural officers of experience in this country, that this industry is one which might well be developed in India.

First, I wish to draw attention to the markets that exist for such a product and the prices realisable. Secondly, I would place before you the costs of production, and thirdly, the sources of supply in India.

Market.—I have ascertained that all the dry whole egg or dry egg yolk that we can manufacture in India will meet a ready sale in America if the price is low enough and the preparation up to the required standard, numberless biscuit and bakery supply houses in New York, Chicago and other cities of the U.S.A. sell waggon loads daily.

The trade has been established for the past ten years and is steadily increasing.

There is also a large demand for dried albumen for manufacturing purposes.

If we desire the same trade with Great Britain we can study her market conditions. Great Britain purchases annually 2½ million pounds sterling of Chinese eggs. These eggs enter England as egg in shell, liquid yolk and as dried egg powder.

I have a recent letter from "Pulvo" Limited, one of the largest British firms dealing in the dried egg commodity, who own extensive factories in China, stating that they have their eyes on India with a view to this trade, and they are only watching developments.

I also placed the possibilities of this trade before Sir D'Arcy Lindsay of Calcutta, a few months ago and he considered that the provisioning of ships with dried eggs is a trade worth our consideration.

He explained that milk is always carried in this form and if eggs were available at Indian ports in the same form it would be readily bought for culinary purposes.

He promised to look into the matter on his return to India.

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Prices realisable.—In America 1 lb. of dried whole egg fetches 80 cents or approximately Rs.2-3-0 per lb.

I might here mention that 1 level table spoonful of this whole egg powder equals a 2 oz. egg and added to 3 parts of warm water becomes exactly like a liquid fresh egg and as such can be used in exactly the same manner as a liquid egg. That is to say the properly prepared egg powder is perfectly soluble in water and retains all the characteristics of the original egg.

A still higher price is realisable for dried albumen or white of egg which is used in printing mills for glazing papers, &c.

This preparation properly manufactured fetches as much as Rs.4 per lb. or \$1.50 in America.

Cost of production.—It takes 50 Indian eggs to make 1 lb. of dry whole egg. The cost of drying eggs in China by modern machinery amounts to 2 cents or less than one anna per lb.

The cost of the latest type of egg drying machinery amounts to 15,000 dollars or Rs.41,250 landed Lucknow.

This machine is made in Los Angeles, California. It is capable of drying 2,000 pounds of dry egg powder per day.

The manufacturer offers to bring such a machine and instal it in Lucknow for half a lakh of rupees. He is confident that it will be followed up by many orders.

The sources of supply in India.—The price of eggs in India varies. After very exhaustive enquiries from many parts of India I have ascertained that eggs are cheapest and most plentiful in Chittagong where 25,000 eggs are available daily in the market.

One correspondent writes that eggs can be bought from villages in this district for as low a price as Rs.4 per thousand eggs.

In parts of Madras a correspondent offered eggs at a similar price.

Here in the United Provinces eggs are procurable in villages for from 4 annas to 6 annas per dozen; this is four times as expensive as in the rural areas I have mentioned above.

This rate, however, is an average rate for the greater part of India, or at least for those parts which supply large cities. Dealers in the bazaars sell at double and treble these rates to the public.

This flat rate of 4 annas per dozen however compares favourably with Chinese rates and is one quarter the price of fresh eggs in either America or Great Britain.

It would mean therefore a large margin of profit to the manufacturer of egg powder and incidentally make the egg producing business in India a most profitable one.

Now is the time to secure this trade, while Chinese trade conditions are at a standstill. This opportunity may not come again.

Objection may be raised as to the question of sufficiency of supply, for each factory will require some 50,000 eggs per diem to make it profitable.

This amount could very easily be produced by Indian villagers, and if once they found this number was required and if they got regular sales, they would soon produce more.

It is well known that poultry reproduce themselves in a very short time and a temporary shortage of eggs would soon adjust itself by more poultry being produced.

Another objection that may be raised is how the ordinary city market supplies would be met, if all village eggs are commandeered for the factories.

My reply is that the large army of unemployed young men could in a very short period start large poultry farms on modern lines and supply Indian markets with large and wholesome eggs and fowls at remunerative rates. It is the aim of this Association in this Province to equip men qualified to start such farms.

A dried egg trade would temporarily increase the cost of living and fetch for eggs a better price, this is all for the good of the industry and for the good of the nation.

I consider India most pre-eminently suited for the production of ducks and fowls on a very considerable scale. The experience of some 25 years in India has led me to this conclusion, and the latter ten years of my service spent exclusively in studying and experimenting on better and higher scientific methods of poultry farming have further impressed this on my mind.

In fact, it is not too much to say that in poultry farming lies a remedy for the present condition of the low caste and for the Mahommedan ryot and of his equally unfortunate brother, the unemployed though educated young men of India.

APPROXIMATE ESTIMATE FOR THE ERECTION AND UPKEEP OF AN EGG DRYING PLANT.

	Rs.
Cost of complete plant producing 2,000 lbs. dried egg per day of 10 hours F.O.R. Lucknow \$15,000	= 41,250
Cost of competent engineer from America to install and put the first plant in operation	10,000
Building 50 × 50 feet with 15 feet ceiling	1,500

Net profit schedule.

<i>Operation cost.</i>			<i>Operating profit.</i>		
	Rs.	as. ps.		Rs.	as. ps.
100,000 eggs per day at 1 pice each	1,562	8 0	Sale in U.S.A. of 2,000 pounds per diem at Rs. 2 3 0 per lb....	4,375	0 0
1 ton of coal	15	0 0			
Lubricating oil	4	8 0			
Three men at Rs. 1 per day	3	0 0			
Dried egg containers (kerosine oil tins)	40	0 0	Total daily operating expenses	2,052	8 0
Label etc.	6	0 0			
Freight to Calcutta on 2,000 lbs. dry egg	125	0 0	Net daily profit	2,322	8 0
Freight to New York, U.S.A.	250	0 0			
Overhead charges, Office, etc.	45	0 0			
Rent of Land	1	8 0			
Total daily operating expenses	2,052	8 0	Net daily profit	2,322	8 0

Oral Evidence.

36,389. *The Chairman:* Mrs. Fawkes, you are Secretary of the United Provinces Poultry Association and you are engaged in the service of the Provincial Government, I think, in conducting certain investigations into poultry breeding and also in carrying on propaganda?—Yes.

36,390. For how long have you held that post?—Since the end of 1919, a little over seven years.

36,391. We have had from you and from other sources a certain amount of information on this subject; is there anything else you would like to say at this stage in amplification of what we have had in writing, or may we ask you one or two questions?—I am afraid I have a lot to say, if I may.

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36,392. If anything occurs to you at the end of your examination, please say so?—Yes.

36,393. You realise that the Commission has had an opportunity of reading through the written matter, and it will not be therefore necessary to bring out your various points in oral evidence. Have you witnessed a good deal of progress in this movement since you undertook it?—Yes, I have witnessed almost, you might say, a revolution in the point of view of both Government officials and Indian public as regards the poultry industry since I came to India.

36,394. Do your activities extend throughout the Province?—Yes. It is, of course, a very big parish to cover.

36,395. Have you any organisation through which you can work?—Yes, I work through the District Magistrates; for instance, if I am going to a certain district, I inform the officer in charge of that district. I am also in touch with the District Boards, and when they hold exhibitions I either invite myself or they invite me to come and hold a poultry demonstration or a poultry show for the villagers or to give a lecture. In that way I am in touch with the whole Province through the official channels.

36,396. Would you say that, on the whole, the effect of your propaganda has been more marked in districts contiguous to your station here than at a distance?—I think it is fairly well spread over the entire Province. I have not visited the west of the Province so much as I have the other parts, owing to its distance from headquarters, and it may be that that part of the Province is not so much affected. I have not penetrated as far as I should like in every direction. I may say I am handicapped in propaganda work by having so much to do at headquarters, having no assistants.

36,397. I suppose you feel you could spend more funds?—Yes, I am cramped for want of means.

36,398. You may be surprised to hear that other witnesses think the same thing of their own particular fields of activity. In these various papers with which the Commission has been provided, there are statements as to the various markets which are open to Indian eggs. First of all, I want to ask you about the work of primary collection, that is to say, the organisation by which eggs are collected from the villagers and brought, let us say, to a town for local consumption in that town; how is that carried out in India?—That is carried out by means of dealers, *beparis*, who make house to house visits, collect eggs and bring them by rail, cart or coolie to the big towns and sell them.

36,399. Do they sell them to the shops in the bazaars?—Yes. There are certain egg merchants in the bazaars; in the Ahmedabad market there are ten or twelve such merchants, and they buy from their different agents in the country; these egg merchants sell eggs directly to the cooks and to the general public.

36,400. So that, as a rule, so far as eggs consumed in Indian towns are concerned, you have the primary collector, an intermediary and the retailer?—Yes.

36,401. Do you know at all on what margins of gross profit these various intermediaries operate?—I have made fairly extensive enquiries all over India, and I find that the villager gets a very small price for his eggs; in most places he gets about a pice an egg; that is an average price. I think the agent employs collectors and he makes the profit; he cannot possibly come and collect all his eggs himself; he is the contractor.

36,402. What does he get for the egg that has cost him a pice?—I think he gets an anna in the city.

36,403. So that you have to add to the price the cost of collection and transport, and then the rest of the anna represents net profit to him?—Yes. Of course, it depends where he is marketing his eggs; if he is marketing them in a small town, he cannot ask the price that he can in Lucknow, Delhi or Meerut.

36,404. Have you any co-operative societies dealing with poultry breeding and the sale of eggs?—No, but I have approached the Co-operative Department here to try and help the very poor depressed classes of the Etah district in this Province who have a very large amount of eggs which we have helped them to produce; we have asked the Co-operative Department to assist us in marketing these eggs; correspondence has taken place, but I do not think anything tangible has been done yet; I am most anxious that something should be done.

36,405. It would appear to be a promising commercial opportunity for the co-operative movement, would it not?—Yes, because they could take the profits that the middleman is making and give more to the peasant, if it were worked properly.

36,406. And would another very important, and perhaps more important, aspect be the educative opportunity?—Yes, certainly. The better class of egg producers are coming to me and saying: "I have, as you suggested, taken up the better egg, but I cannot get a better price for it except by private sales to educated people who appreciate the value." The cook has nothing to gain by buying a bigger egg; he prefers to have his small village egg, which is cheap.

36,407. I understand that the cumulative effect of your experience put shortly is that there is nothing to prevent your developing a race of fowls very much more efficient as egg-layers and as table poultry than the ordinary indigenous breed which would also meet the requirements of the ordinary villager in the matter of disease-resistance, ability to look after themselves, and so on?—There is no difficulty if one is given the opportunity to develop such breeds.

36,408. Would one of the difficulties in popularising a breed of that sort be that, in the meantime, there is no prospect of the poultry breeder getting value for weight of egg, that is to say, for quality?—Yes, he will get the value from a certain educated portion of the community, but he will not get it as a general rule.

36,409. And your hope is that the educated portion of the community may grow?—Yes, and there is no doubt but that it is growing.

36,410. Is there a demand for table poultry?—There is a very big sale for table poultry in all cities.

36,411. And there again, are you experiencing difficulty in claiming price for quality?—No, I think that is easier, but that is not so largely undertaken.

36,412. I think the Commission is fairly familiar with the position as it is affected by the caste difficulty; I do not know whether you would care to enlarge upon that at all?—I should like to impress upon this Commission that the caste difficulty seems to be lessening since my propaganda work started, as the public interest has been aroused in regard to poultry farming. The students who are coming to Lucknow are largely Brahmins who wish to take up this industry; my present farm manager is a Brahmin by caste; a half to three-quarters of my Indian enquiries come from Hindus and Brahmins. If that can happen now, when a few years ago the fowl and the egg were absolutely unclean, I judge that education in these matters must be having some effect; it is realised that if fowls are kept clean there is a difference.

36,413. *Professor Gangulee*: Do you not get Mahommedan students?—I certainly get Mahommedans, but, as I say, the larger part of my students are Brahmins and Hindus.

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36,414. *The Chairman*: Have you persuaded Europeans who live in the country to take up the improved breeds?—Yes, and especially the Anglo-Indians; they are very keen on it; most of the Anglo-Indian communities, especially railway employees and their families, make a little pocket money by breeding the better classes of fowl; I may say this is one of the sources of good poultry in this country, and through Anglo-Indians the industry is penetrating to other communities in India; nearly all Anglo-Indians are lovers of poultry.

36,415. Is Government either directly or indirectly subsidising persons willing to take up poultry breeding under your direction?—No, nothing is done in that way.

36,416. With a view, of course, to making such people agents for the distribution of the eggs of improved breeds?—No, there is nothing done in that direction; I wish there were. I might also add that there is a great deal of valuable poultry stock going to waste at the present moment. A great many Anglo-Indian people keeping good fowls have spare male birds and cockerels which they kill and eat; those birds would be most valuable if spread in villages.

36,417. I judge from your note that your advice is sought from many Provinces other than the United Provinces?—I may say that I am the Imperial Adviser at this moment; it sounds rather big, but I have letters from all over India, and I am trying to answer all of them. Until recently I have been the only official representative of this industry, and it is up to me to try and spread it.

36,418. But your own salary and the expenses of the station are being paid entirely from the funds of the United Provinces?—Yes.

36,419. Have you any views as to which Province after the Province which you serve is ahead in this matter?—I think Madras is ahead. I think that Bombay, with its new Poultry Association, is forging ahead, and Bengal is ripe for development; I think the Punjab also has appointed a poultry expert recently.

36,420. Would there be adequate supply of chicken food in India?—Yes, there is plenty of it.

36,421. I think we have from you in these notes a very clear account of your views as to the possible directions in which the Indian eggs might find the market. Is there any prospect of any experiments in egg-drying processes being made, you think?—I have brought this sample with me; it is made of village hens' eggs dried in this country; Mr. Edwards has very kindly prepared it at Muktesar in a serum dryer. It is rather an expensive way of producing it, but it proves that it is perfectly possible to dry eggs in India. The second bottle I have contains dried albumen; this is the quality that we must attain if we are going to capture the market for dried albumen.

36,422. I am wondering whether you can tell us whether there is any firm hope of a venture being made in the near future in this direction?—Yes. I think that if you, as a Commission, show the possibilities of the trade and the matter is made public, it will certainly be gone into by business men; I think it only requires to be broadcasted and known. In fact, several firms have already written to me from abroad, one being Pulvo Limited, as mentioned in my written reports, saying that they are watching the developments and are keeping their eyes on India in case anything happens to their Chinese trade, and that is why I am anxious that the poultry industry here should be developed in case such an emergency should occur.

36,423. Meantime, there is no export of either eggs or egg products, except in the shape of supplying ships for their voyages?—That is all that I know of.

- 36,424. You have studied the matter closely?—Yes.
- 36,425. Have you ever asked the Government of India for information?—I have asked officials. I know there is no export of eggs.
- 36,426. You take it for granted, do you?—Yes.
- 36,427. Have you sought information from the ports?—Yes, from Chittagong. There are no eggs going out except for provisioning ships and to Burma and Akyab.
- 36,428. Is there an importation of albumen into this country?—Yes; we are buying it at present, I believe, from Germany, in fairly large quantities for mixing with paints and for use in printing mills for paper manufacture.
- 36,429. Do your responsibilities extend to ducks and geese?—Yes.
- 36,430. Meantime, you are concentrating on chickens?—I am developing pigeons and ducks, both.
- 36,431. But not geese?—Certainly, I encourage geese; India already has geese. The Indian goose and the Indian duck do not require as much attention as the Indian fowl; it is more immune to disease and seems to get on very well in the villages.
- 36,432. It would appear that certain districts in Bengal are better suited to duck than chicken?—That is so, and the duck egg will be very valuable commercially.
- 36,433. Can you account at all for the fact that there are not many more domesticated duck in Bengal?—I think it is due to shortage of stock.
- 36,434. You have had a good deal of experience in these matters, and you no doubt have seen a good many persons in villages taking to poultry breeding who had not done so, at any rate on any informed or deliberate plan, before you persuaded them to make the experiments. Is the average villager capable of taking up a matter of this sort and carrying it on without constant inspection and encouragement?—Not if he is given imported European poultry, and not unless he is given a fowl immune to the village conditions; he is not capable of looking after the imported or better class of fowls; he can only look after his own kind.
- 36,435. Have you succeeded yet in producing a race of fowls which the average villager can look after for himself without advice?—No, because I have not been enabled to carry out experiments. I have simply been told to make a commercial business of the farm, which means I must sell birds which the public will buy. I have every hope of producing such a bird if I am allowed to carry on such work.
- 36,436. Unless such a bird is produced, it is difficult to say what service your activities can be to the ordinary cultivator in the rural district?—If I may say so, the present fowls that they already possess, if multiplied, would be quite all right for the purpose we have in view.
- 36,437. Have you attempted any improvement by selection of the indigenous breeds?—Yes, to a small extent; but there is a great deal more that could be done in that way. But for the purpose of the trade of which I am speaking, there are so many ordinary fowls already in the country that they could be used for the export trade without any further improvement; that industry could start at once.
- 36,438. *Sir Henry Lawrence*: We are told that the Indian breed at present produces about 60 oz. of eggs per year?—Yes, taking an egg at 1 oz.
- 36,439. The imported bird produces as much as 300 ozs.?—Even more than that. The English egg weighs double the Indian egg, 2 ozs., and the English bird produces double the number of eggs.

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36,440. That only comes to 120 eggs and 240 ozs.?—Many English birds will lay even more. From 150 to 250 eggs per annum in some cases.

36,441. That is four or five times the production of the local fowl?—Yes.

36,442. Do you know why the various experiments made in India by the Agricultural Department and others have come to an end?—The chief reason has been the lack of expert knowledge; another reason is disease. In this present venture of ours we have discovered that it was the invasion of the tick that was the cause of most other ventures not succeeding.

36,443. Do you suggest that the tick disease and other diseases can be controlled?—Certainly; they are quite controllable.

36,444. How?—By teaching simple improved methods of sanitation, cleanliness and simple remedies.

36,445. Through what organisation would you give the villager these instructions?—I think we must have a poultry organisation of our own and teach by our own staff.

36,446. Through travelling Inspectors?—Our Indian-trained students, if they are in sufficient numbers, could form a staff to teach the villagers. By means of bulletins and propaganda we can do much.

36,447. But the villager must be shown in his own home exactly how the disease can be controlled?—Yes.

36,448. And you suggest that there should be a fairly large staff entertained by the Department of Agriculture in every Province for this purpose?—Yes.

36,449. You think that it is financially a remunerative proposal?—I certainly do, if we develop the industry. But I do not think we shall benefit India's revenues or benefit the position of the peasant by increasing the total number of eggs produced unless at the same time we develop a market for these eggs.

36,450. You could improve the food supply?—Yes; but I think we should be getting a very large amount of production without an outlet for it. Of course, there is this point, that the educated man is now taking to eggs and the demand for eggs is likely to grow, but not fast enough to make a sufficient outlet.

36,451. Do you know of any Indian breed of fowls which have been exported from India and have been bred and improved in England?—The species and genus fowl came from India; all birds have been originally developed from Indian fowls.

36,452. From what stock?—From the Indian game and from the Chittagong breed. The Chittagong was bred with Chinese varieties, and in ancient days even the Chinese get their species from India. India is the home of the fowl.

36,453. But the knowledge and experience of India has been lost?—It has been lost through neglect of the culture of it. In bygone days the trainers of fighting birds were people who knew all about fowls and who spread such knowledge.

36,454. In Western India was the Basra breed at any time well known?—A note was written by a police officer, of the Bombay Presidency I think, many years ago, and in that note he refers to the Basra breed; so that, it has been known in the western part of India for some time.

36,455. Was that breed ever imported into England?—I do not think it is known in England, but I will make it known now.

36,456. My impression is that it had been imported in former days?—Not to my knowledge.

36,457. *Sir Thomas Middleton*: From the producer's point of view, success in poultry keeping will depend on the possession of suitable breeds, abundant food supply and cleanly methods?—Yes, these are ideal conditions.

36,458. You have already indicated to us, especially in reply to Sir Henry Lawrence, that there will be no difficulty in getting suitable breeds in India, India being the home of the fowl, and the experience of those who have been keeping poultry in India in recent years is that good breeds, if not available, might easily be found for each district—Yes.

36,459. Next as to the food supply: you point out that India is singularly rich in suitable food grains for poultry?—That is so.

36,460. From your experience, which grains could you name as being the best for use?—A mixture of grains, but the cheapest grain is paddy in Bengal, *ragi* in Madras, and *bajra* and maize in this Province. All these are most useful. Wheat is very good for fowls, but it cannot always be provided as it is more expensive.

36,461. In fact there is a very wide selection?—Yes, poultry will take almost any grain.

36,462. In addition to that, there is in India a very large stock of natural food, is there not?—Yes, especially in the rainy season, when they live largely upon what they pick up from the ground; there is a great deal of animal food there to be obtained.

36,463. With regard to cleanly methods, it is only within recent years that we have appreciated the need for this in poultry keeping, and naturally your difficulty arises in getting methods demonstrated?—Yes.

36,464. Would it not be possible to use the demonstrators of the Agricultural Department to carry the knowledge of methods of disinfection, &c., to the villagers?—Certainly; and I think the Agricultural Department would do well to include poultry in their activities. Veterinary Assistants also would be of very great help, and it would be a good thing if each Veterinary Assistant in the Province knew something about poultry diseases.

36,465. Can you tell us whether any of the Agricultural Departments outside the United Provinces have been giving special attention to poultry in the last ten years or so?—Yes, they have been giving attention; in the Punjab a poultry expert has been appointed; in Bombay Dr. Mann, as Director of Agriculture, is furthering it a great deal because he thinks it is a valuable pursuit in famine tracts for his peasants; he has started a poultry farm in connection with the Agricultural College at Poona; and in Bengal they have now started a poultry farm at Dacca, with one of my students as manager.

36,466. Do you know whether anybody has attempted, by means of short special courses of instruction, to teach the demonstrators the essential points in disinfecting poultry pens and runs?—No; if they wish anyone thoroughly to be trained in poultry, they send him to me.

36,467. No short courses are being conducted locally?—Not that I know of.

36,468. *The Raja of Parlakimedi*: Apart from these Brahmin boys coming to your place to learn poultry-farming, are there actually Brahmins who have taken to this work?—Yes, I know of several Brahmins who have started poultry farms of their own.

36,469. In this Province?—The Raja of Marsan is of course a high caste Hindu. He has the largest poultry breeding establishment in this Province; Mr. Chatterji of Lucknow is a Brahmin and is starting in Lucknow itself; Mr. Pimpalkhute Rao, a Brahmin, has started a poultry farm at Nagpur and another Brahmin student has a farm at Bhagalpur.

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36,470. Since this work started, have you kept any record of the farms that have come into existence?—Yes, we do keep a record of every farm that has started through our efforts, and of people to whom we have either given advice or for whom we have trained students.

36,471. Has there been an appreciable number of such farms?—Yes, a very large number of these farms have been started. My difficulty now is to stop people from starting farms. They want to start straight away without first obtaining knowledge of poultry-farming and I am so afraid they will fail.

36,472. Barring your place, are there no places where people can get themselves trained?—I think at Sangli there is an industrial school which is now taking in some apprentices; there is also one of my students in Dr. Rabindra Nath Tagore's Institute who, I hear, is wanting apprentices and I think in South India, at Coimbatore, another student is working there in the Y.M.C.A. for rural construction and he is also taking apprentices. But the only well-equipped farm in which we can give a full training is in Lucknow.

36,473. As regards the hybridized varieties of Indian poultry, what are the breeds of English poultry that you would suggest?—I consider the Leghorn fowl has proved its value in tropical countries for crossing with the indigenous fowl in order to improve such fowls.

36,474. Has it been tried?—Yes, I am closely following work in the Philippine Islands which is done by the American Government and they have succeeded in producing a fowl by crossing imported breeds with their indigenous fowls that can stand native conditions and yet is a good producer of eggs.

36,475. Has it been tried in India?—Yes, we have done it in Etawah district where we have a large number of such cross-breeds, and these are giving very valuable returns to the villagers.

36,476. Are the eggs which are produced as good as, or about as good as, the eggs produced by the pure bred Leghorn?—Yes, the effect is really marvellous. The progeny produces double the number of eggs the mother produced and the size of the eggs at the same time is improved.

36,477. As regards immunity from disease, what is the effect?—The imported fowl is very susceptible to tropical diseases and that is a point which requires careful experiment in order to produce a fowl that is not susceptible to disease. That can only be done by using selected Indian breeds.

36,478. Are these crosses as good as their mother in the matter of resisting disease?—Not quite as good, but they are more immune than the imported ones and I think by the time we have obtained the third and fifth cross we shall get more immunity. That of course is a matter for experiment.

36,479. *Sir James MacKenna*: I was rather sorry that you did not include Burma amongst the more progressive Provinces?—Yes, I am sorry that I did not do so.

36,480. Do you see any possibilities there?—Yes, I think that if Government gave a helping hand it would be of great assistance. I have had many letters from Burma asking me for advice and, as you know, I have lately written a book in Burmese.

36,481. What is your view on development in the Provinces? Has the attitude of the Agricultural Department been sympathetic, and have the general public shown more interest?—The Agricultural Departments are most sympathetic, but they rather want a lead.

36,482. Yes, they want everything done for them. Do you think that poultry breeding should be taken up as a central subject by the Government of India?—I certainly think it should.

36,483. What could the Government of India do in the matter?—I think that they should adopt poultry breeding as one of their occupations in the same way as they have taken up dairy farming and animal husbandry. I consider small animal husbandry should not be excluded, and that attached to each agricultural farm there should be a poultry station. There should also be a central poultry institute and breeding farm with an experimental station.

36,484. Do you think they would have to open more than one farm?—I think that a central farm should be started first of all; and then the central organisation should make grants to the Provinces to enable them to start breeding farms.

36,485. What site would you select for your central farm?—I should think Bangalore would be about as central as any place I can think of.

36,486. How would the Government of India co-ordinate the work in the various Provinces from this centre?—In the same way as they are co-ordinating other work.

36,487. We have heard a lot about co-ordination and I thought that you might be able to help us in this matter?—I should be very glad indeed to draw up a scheme if you wish me to do so and if you would entertain such an idea. It could be done on the lines on which poultry development is carried out in England by the Ministry of Agriculture. They have a National Poultry Institute and they also have breeding stations where good eggs are available to the people at low rates. We could adopt that principle here in India.

36,488. Is there much research work waiting to be done in poultry?—Yes, Muktesar is very kindly assisting me in this matter; if they had a larger staff and means they could do a great deal more.

36,489. With regard to poultry diseases you say that such work should be taken up by the Veterinary Department?—Yes, and I would specially ask that research might accompany any work that is done.

36,490. What about the actual breeding?—That ought to be done by experts who understand Indian conditions.

36,491. On the local farms or on the central farm?—It should be first carried out at a central farm and from there spread to provincial farms, work being based on the experience gained at the central farm.

36,492. Have you any idea as to how the Government would finance this scheme? Would they put a cess on eggs?—I put up a scheme to my own Government in which, as we developed this industry, a small cess on the sale of eggs might be levied, in order to bring in some income to the Central Government.

36,493. Would it not kill the industry?—It would have to be done gradually.

36,494. Would you be in favour of a central All-India Poultry Committee?—Yes.

36,495. Would you have that separate or would you link it up with the Dairying Committee?—I would link it up with the Dairying Committee provided that the Poultry Committee was well represented by experts who understand poultry-breeding, and that such a Committee should not be swamped by people who were not poultry experts.

36,496. At home the channel for distribution is the grocer's shop?—Yes.
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36,497. About your scheme for dried eggs, where would you allocate this factory? You want 6,500,000 eggs a year? Where do you think you would get these from?—I have made enquiries and have inserted advertisements in the Press asking for a supply of 50,000 eggs a day, and you would be astonished at the number of answers I received. I had an endless stream of letters offering to supply them. I made enquiries, especially round about Chittagong. I have ascertained that 25,000 eggs a day come into the Chittagong market. In the districts round the foot of the hills near the borders of Assam there are eggs almost going to waste. They tell me also that in Bolpur district, Bengal, the eggs are similarly going to waste, the villagers cannot get money for them. There are certain other places where there are ever so many eggs.

36,498. You do not think that there will be very great difficulty in building up an organisation to provide the raw material?—I do not think so. I think we could call for tenders for supplies for two to three years, to ensure our not having to pay high prices.

36,499. There is only one other item that makes one put the question. You are sure of the freight to Calcutta?—Yes; this is on facts that I have got from the local railway people.

36,500. Where did you start from?—From Lucknow to Calcutta. The freight to America is over-estimated; it was based on my own experience of the freight to England. Messrs. Balmer, Lawrie & Co. have since written to me to say that they will take a ton of this dried powder, in cases of 40 cubic feet content, for Rs.75.

36,501. Do you not think that, relatively to the transport to America, the railway freight in India is high?—Yes, but this is usual in every commodity; railway freights are far above the shipping freights.

36,502. Do you think that the question of railway freights is a matter that might be considered in the interests of the industry?—Certainly.

36,503. The figures are very striking?—The rates for live poultry are absolutely killing; they are strangling us; we cannot send poultry any distance. The railway companies measure the crates and charge accordingly, and in this hot climate we must give birds room to breathe; it is perfectly terrible how birds have to travel in hot luggage vans; it costs me more to send fowls in crates to Madras than it does to send a man; in fact, a man has to accompany them according to railway regulations.

36,504. *Professor Gangulee*: Have you been to Bangalore?—No, I have not been to Bangalore; I have only had a good many letters from the people there.

36,505. You say that you would like to see a poultry farm attached to the Imperial Institute of Animal Husbandry?—Yes.

36,506. Would you like to make the poultry farm separate from the Animal Husbandry Institute, or would you just have the poultry farm attached to the Imperial Institute of Animal Husbandry in Bangalore?—Poultry breeding is a specialised job; it is not a job for the dairyman to come and say how poultry must be bred; as long as we are independent in our organisation, we can certainly work in with the other animal breeding activities.

36,507. Is it your experience that there is a great deal of loss of village poultry through disease?—Yes; lakhs of poultry are lost through chicken-pox and through fowl cholera, and all those losses could be mitigated.

36,508. Do you have any facilities on your own farm to carry on any experiments?—Very few, though, of course, we have learnt how to cure both ticks and chickenpox. If we had had an outbreak of fowl cholera, which, fortunately, we have not had, we could have got vacancies made at

Muktesar, such vaccines could be made available to the public in the same way as the cattle vaccines are.

36,509. Do you find that the village women are taking more interest in rearing better poultry?—I think they would do so if they were given the chance; of course, they are so very uneducated. When I go to Aligarh for the District Poultry Show, I have village women coming to me and begging me to give them a better class of fowls.

36,510. Are they Mahomedan women?—They are low caste women. They storm round me saying, "Memsahib, give us pure bred fowls." I have pure bred cocks, and I distributed and I give prizes for the resulting chickens that are brought back the following year. I have to turn many away, because I am not able to give them all they want, though they would gladly have them.

36,511. Women in villages, of course, have more time?—Yes.

36,512. If you could interest them, you could really lay the foundation of the industry?—Yes.

36,513. In your propaganda work, you make an effort to reach the women?—Yes; I have tried to interest by means of lectures and talks to *purdah* ladies too.

36,514. Of the Indian breeds which you have, the Chittagong breed has great prospects over others?—Yes. I am also very pleased with the Basra fowls that come to me from the western side; they came, I believe, originally from Mesopotamia; this breed has the stamp of a layer. The Chittagong is more a table bird, but I think it could be bred for laying too.

36,515. You said that there are plenty of eggs, and they are going abegging. It only strikes me that before you are able to stimulate poultry farming you must also provide better marketing facilities?—Yes, that is so; that is why I want a big export market for our eggs.

36,516. Better marketing facilities should then be considered as prerequisites to successful poultry farming?—Yes; both go together.

36,517. Have there been any experiments about packing, which is an important question?—The Ministry of Agriculture at Home (I hope I am well informed) have now made a crate compulsory which is non-returnable; a similar crate could be made cheaply in this country.

36,518. Of course, you will have to have some facilities from the railway authorities?—Yes, the railways must be approached at the same time. They do take eggs at a fairly low rate; it is for livestock that they charge such very expensive rates.

36,519. Would you agree with me that, in order to have better marketing facilities, the first thing is to have co-operative marketing societies?—Yes.

36,520. The second thing is a better packing arrangement, and the third is some concession rates from the railway authorities?—Yes.

36,521. Who are your best customers?—They are educated Indian, European, and Anglo-Indian poultry breeders. The villagers can do very little; what we give to the villagers is practically charity as I have to run the farm as a commercial concern, and I cannot do the work I meant to do for the villagers. Government started the farm as an experimental breeding station, but owing to financial stringency I was obliged to make a commercial success of it.

36,522. Are they prepared to pay a good price for your goods?—Yes.

36,523. About Mr. Slater's work at Etah, I understand he is teaching the villagers poultry farming?—Yes, and he has raised the status of about 15,000 people.

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36,524. I am told his work is among the depressed classes?—Yes, but he is meeting with opposition.

36,525. Why?—Because the landlords do not always wish the depressed classes to be improved. For the last seven years, his poultry show in Etah has been the only thing of its kind there, but the local District Board this year I understand, are holding a rival show in Etah on the same dates. That is the attitude of some of the people of this Province.

36,526. The conflict is still going on?—It is going to occur at the end of this month. I cannot say if it is absolutely true, but I have heard about it.

36,527. Are the Slater Mission carrying on poultry breeding?—Yes. We give a small grant from our Government; I have also given out cockerels to them. It is a wonderful work they are doing, and it deserves to be well supported.

36,528. Are there any other missionaries carrying on the same sort of work?—In Sangli, in the Bombay Presidency, they are doing this kind of work; there are many missionaries now taking up this work, and finding it a very useful side line for their converts.

36,529. Do you find any Indian agency taking it up?—Certainly. Dr. Tagore has taken it up.

36,530. Are there any such agencies in the United Provinces?—The Salvation Army have taken it up.

36,531. They are mostly Christian missions. Are there any Indian agencies, like social service organisations, which have gone in for poultry farming?—The criminal tribes settlements in one or two places have started poultry breeding, and in places like Rori near Cawnpore, Bareilly and Moradabad they are doing it.

36,532. Do you charge any fees for training?—There is a nominal fee, and that fee is paid into the Association; students cost the farm a certain amount of money. We have to give them incubators, losses occur in hatching eggs, and very often the doors of poultry pens are left open by students and the breeding birds get mixed. I also have no hostel for the students; this is badly needed; I have to accommodate them in grass huts, which is not convenient. I need an officer to supervise and train the men.

36,533. *Mr. Culvert*: I am not quite certain about your own position. Are you Secretary to the United Provinces Poultry Association?—During Sir Harcourt Butler's time, I was brought out by the Government as Poultry Expert, and had a signed contract as such for five years. I had not been out from Home long when I found myself foisted as Secretary on this newly made Association, and placed in charge of a commercial business, which is not what I undertook to do. I have now no definite status, which of course makes it difficult for me. I am Secretary of the United Provinces Poultry Association, but supposing the Legislative Council in this Province is of the opinion that poultry breeding is not a good thing to encourage, I should be penniless. My salary depends on the vote of the Council. My present contract is worded "Provided funds are given by the Council, you are employed." It is a very unsatisfactory position.

36,534. Do you actually receive your pay from the Poultry Association, or from Government?—The Government make a grant-in-aid to the Poultry Association, and I receive my salary from the Poultry Association. The Association have no funds except those they receive from the United Provinces Government.

36,535. You are not a Government servant?—I am not exactly a Government servant, and yet I am, as Government pay me through the Association; I do not know how to explain it.

36,536. You draw your pay as Secretary and not as Poultry Expert?—Yes.

36,537. Are you connected with the Veterinary Department, or the Agricultural Department?—The Veterinary Department.

36,538. You say you cannot fulfil all the orders you receive. What is the obstacle to that? Is it the smallness of your farm?—Yes. I have not got the number of birds to supply them.

36,539. Is much use made of the demonstration car?—It has only been running for two months, but I have had crowds of visitors, and I have a good many letters coming from people wanting to start farms or buy eggs—who have visited the car. In that way, it is going to be of very great help.

36,540. Does it go about the Province with you?—I meet it wherever I can. Being single handed, I do not leave my farm and my students for long; I have to dart in and out.

36,541. There is nobody else in charge of that car?—I have a student in charge of the car.

36,542. Would you be prepared to say how many fowls per acre in this country would find free food?—I should say 50 fowls per acre would find free food.

36,543. Without giving any grain?—It depends on the time of the year and the climate. You cannot make a general rule; in some months it is so dry that there is nothing living on the ground. In places like Bengal, there is always animal food and a certain amount of small seeds; there are also small fish procurable.

36,544. Then there would be practically no difficulty in the cultivator paying off his revenue, which is Rs.2 an acre, by keeping a few fowls?—None.

36,545. *Mr. Kamat*: With regard to the incubators on which you have to depend, have you taken them into villages and asked the villagers if they were able to handle them?—No. I am in touch with the villagers to a certain extent, because I go to big *melas* and district fairs, and there I have demonstration incubators and I show the chickens hatching; the villagers think I am a witch and can produce a chicken in half an hour. I think it would be too costly to take incubators to the villages, and also unnecessary. They have their own broody hens with which to hatch. I should not attempt to give the incubators to the villages, but only to commercial firms.

36,546. A few years ago, when carrying on propaganda on secondary occupations, I and a friend of mine carried an incubator with us. Everywhere we were told that if the scheme depended on the use of incubators, the villagers were not prepared to try it, because they could not regulate the temperature. Have you ever ascertained whether the villagers are willing to handle it and regulate the temperature?—I have had men to train who were almost villagers and who were possessed of very little education, and they were quite easily taught to use incubators.

36,547. At any rate in my case three villages refused to touch it?—I think it is only a matter of explaining to them a little more.

36,548. Is this poultry farm of yours making a profit?—No, because we are not trying to make a profit. We make it self-supporting, and whatever profit we make we put back into the farm, or use in giving prizes of money or birds to U.P. people.

36,549. I see from your accounts for the year 1925-26 that your receipts from the farm were Rs.11,000 and your expenditure on the farm also Rs.11,000 odd; in the previous year your receipts were Rs.10,000 roughly, and your expenditure about Rs.11,000?—The price of grain has a large

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amount of influence on the expenditure. The price of grain varies, and the feeding of the birds is a large item in the cost of running the farm.

36,550. If a middle-class youth were to start a farm, would he have the certainty of commercial success?—No, because there is a very limited demand for the better class of egg. He can only compete with the village egg. That is what makes it difficult to make petty farming a commercial success.

36,551. So it would not be commercially profitable for a man to run a poultry farm as a private concern?—If he is in touch with a good market, it would be. With better class fowls he can grow double the number of eggs, but as a general rule they are not successful because they have to compete with the bazar egg.

36,552. About this scheme of drying eggs, Sir James MacKenna has drawn your attention to certain figures. I wish to point out one more thing in the same connexion. Your idea is to get a lakh of eggs per day, at the price of one pice each. You are getting eggs at the rate of one pice each now because the number required is so small, but when you have a factory requiring a lakh a day what will the price be, according to the ordinary laws of supply and demand?—I think a tender put out first of all in all districts where fowls are plentiful to cover a period of two years would cover that difficulty.

36,553. It is not a question of putting out tenders. Even if eggs are at the rate of one pice each in Bengal, if the factory is in Lucknow it is a question of transport and heavy demand?—We must start factories only in localities where we can get the number of eggs we want. I have given the maximum output. I do not necessarily say that a factory must have one lakh of eggs per day. You can start a factory with 15,000, but you will get a smaller profit.

36,554. What I wish to draw your attention to is this: You show a net daily profit of Rs.2,000?—Yes.

36,555. If the price of eggs goes up from one pice to one anna, your price for the raw material per day goes up from Rs.1,500 to Rs.6,000, a difference of Rs.4,500, and that wipes away at one stroke all the profit per day, which you say will be Rs.2,300?—Yes, but that is a very high price for eggs in India. I can go into the bazar and buy at less than that, as a retail buyer.

36,556. I am afraid that scheme has not been very carefully considered in view of the price which the eggs might jump to?—I think you will find poultry will be produced in such numbers that the price will go down again. It may be that the price will rise temporarily, and this will bring money to the peasant; the factories will be covered by tenders. The public can well afford dearer eggs.

36,557. *The Chairman*: Have you tried to discover what the expert opinion may be as to the smallest economic unit for this egg-drying plant?—A plant for 15,000 eggs.

36,558. *Sir Henry Lawrence*: Do you find that fowls are very liable to heat in the hot weather?—Yes, in these hot Provinces it is one of our problems. You must provide them with shade and ample supplies of water.

36,559. They can live through it?—Yes. There are exceptions; they may get heat stroke, but with ample shade and an ample supply of water they are very tenacious of life.

36,560. And how about damage by jackals and foxes in villages?—That is why we should develop breeds with the natural colours of the country, such as possessed by the *desi* fowl, which will roost in trees and save their own lives.

36,561. *Sir Thomas Middleton*: Why was your estimate made on this basis? Was this the smallest unit the manufacturers recommended?—Yes. They told me the greater the production the more the profit, and that for under 15,000 eggs it was not a commercial proposition.

36,562. But they recommended a machine of this size?—Yes. It can be turned on to drying milk and* other things if you do not want to use it entirely for eggs. The 100,000 egg machine is the smallest this firm makes.

(The witness withdrew.)

Mr. A. H. MACKENZIE, M.A., B.Sc., I.E.S., Director of Public Instruction and Deputy Secretary to the Government of the United Provinces, Education Department, Lucknow.

Replies to the Questionnaire.

QUESTION 23.—GENERAL EDUCATION (a).—Of the three grades of education referred to in the question, elementary education is the most important as a factor in the development of the agricultural efficiency of the people. At present, the condition of elementary education is very unsatisfactory. There will be no improvement worth the name unless we keep steadily in view the aim of elementary education. I need not give an elaborate definition of this aim. It will be sufficient for some time if we endeavour to build up a system by which boys will be trained to think for themselves, act for themselves, and read for themselves. In order to achieve these aims, we must always remember that how we teach is much more important than what we teach. Education is work carried on, not by systems, curricula or syllabuses, but by men. The first essential therefore is to improve the human agency which carries on the work of elementary education. We have, to begin with, the District Boards which control elementary education in rural areas. Generally speaking, the members have little real interest in education. They are far more concerned with personal questions—e.g., the promotion and transfer of teachers—than with the improvement of education. There are honourable exceptions, but it is rare to find a member of a District Board who, with public spirit and a belief in the value of education, gives time and thought to its improvement. Elementary education in the districts therefore dies from the top. The District Board Act should be amended in order to give large powers to the Education Committee of the District Board: on this committee there should be persons nominated by the Government—men with public spirit interested in education. Such men at present do not, in numbers sufficient to provide the agency for the efficient control of vernacular education, seek election to the Boards. The next need is to extend and improve the system of training vernacular teachers. Training classes, in particular, require better staff, accommodation, and equipment. If, by an improved system of training, we can make the teaching in preparatory classes efficient, a large increase in the number of teachers will be necessary to provide the staff for the consequent increased enrolment in classes III and IV. An increase in the staff will be necessary also in areas in which compulsory education is introduced. Also we require urgently an increase in the number of the district inspecting staff and an improvement in the pay and position of the chief district inspecting officer—the Deputy Inspector. Lastly, we need better school buildings.

* The manufacturers put 100,000 egg size machines on the market so that expansion can be made up to this amount. It need not necessarily follow that 100,000 must be used per day, but under 15,000 eggs, it is not commercially useful and profitable.

It is impossible to expect educational work of value to be done in the dark, ill-ventilated, cramped hired houses in which many of our schools now meet.

All these improvements in the really vital matters will require much thought and work on the part of all concerned—Government, the Education Department, and the Boards. They will also involve large expenditure. In so far as agricultural efficiency depends on improvement in elementary education, it is vain to look for this improvement merely in the introduction of school gardens or rural subjects. There is no doubt that we could effect improvement by such changes in the curriculum (if we begin by introducing them in training institutions), but over-emphasis on their value is apt to do more harm than good by diverting attention from more vital needs and by encouraging the belief that real progress in education can be made by changes which involve little expenditure.

Middle vernacular schools are much more efficient than primary schools. The chief needs in regard to middle vernacular schools are more schools (to keep pace with the expansion of primary education) and better buildings, especially hostels. There is more scope and greater need in the middle school than in the primary school for changes in the curriculum. Efforts are being made in these Provinces to improve the middle school by the introduction of agriculture and manual training in the curriculum. Other changes aiming at linking up the work of the Education Department with the work of the Public Health and Co-operative Departments are under consideration.

(b) (i) We should improve the teaching of nature study in primary schools and continue our experiments in the teaching of agriculture as a subject in middle vernacular schools. We should also give liberal grants-in-aid and every possible encouragement to private bodies (e.g., missionary societies) which are dissatisfied with our present system of vernacular education and wish to experiment on new lines. The Education Department itself should continue its own experiments. For example, we may be able to introduce in the middle school some instruction in such subjects as co-operation, agriculture, and rural sanitation. We are now examining the questions, whether it is possible to frame suitable courses in these subjects, whether room for them can be found in the curriculum, and whether the type of teacher whom we employ in the middle vernacular school can be trained to teach them in such a way as to secure the attention of school boys, elicit their interest and develop their intelligence. Our aim is to endeavour to frame a curriculum which will interest boys in rural life, predispose them to agricultural pursuits and, at the same time, extend the range of their knowledge, stimulate their imagination, develop their minds, and give them permanent intellectual interests. It is difficult to frame this ideal curriculum (educationists in western countries are struggling with the same problem) and still more difficult to equip our inferior teaching agency with the gifts for teaching it. But we are fully alive to the need for making our practice conform more closely to our theory. On the other hand, this much must be said in answer to impatient critics of the Education Department—and they are not a few—that the only effective means of making boys contented with a rural life is to make the land attractive to them by improving the economic condition of the villager. To try to attach boys to the land by teaching rural science is much like trying to make them live good lives by imparting to them lessons in "moral instruction."

(b) (ii) The Primary Education Act permitting District Boards to introduce compulsory education in rural areas was passed by the Legislative Council only in February, 1926, and received the assent of the Governor General on April 21, 1926. No board has yet applied the Act. But the Education Department has published for criticism draft rules framed under the Act and has invited the Boards to apply for permission to introduce compulsory education. Government have agreed, provided funds are

available and are voted by the Legislative Council, to give the Boards which apply the Act assistance to the extent of two-thirds of the extra cost involved.

(b) (iii) The reasons are—

(1) The economic condition of the people. Parents need the services of even small boys for such light tasks as herding, gathering firewood, and nursing their little brothers and sisters in order to release their mothers for manual work.

(2) Bad teaching in the lower classes and lazy headmasters. Where there is efficient teaching in the infant classes and a conscientious headmaster, one usually finds good attendance in classes III and IV.

(3) Poor buildings. Over 7,000 of our schools are held in hired houses. These are of a kind which do not inspire any respect amongst parents for the work done inside them. "Work meanly housed is meanly regarded." It is significant that in an Indian village the building which commands most respect is the police *thana*, whereas in a Western village it is (next to the church) the school.

(4) Lack of schools with upper primary classes. Villages are usually separated from one another by dreary desolate spaces, often by jungle or ravines. Parents are afraid to send their children a few miles outside their own villages for education.

Oral Evidence.

36,563. *The Chairman:* Mr. MacKenzie, you are Director of Public Instruction in the United Provinces and you are a Deputy Secretary to Government?—Yes.

36,564. We have your note of evidence; would you like to add anything to that at this stage?—The main point I was trying to emphasise was that the chief need in regard to vernacular education is to make our existing schools better than they are; I think the way of improvement lies in doing better what we are now attempting to do, rather than making changes in the curriculum.

36,565. Would you, for the present, improve rather than extend the present system?—I should try to do both.

36,566. From your knowledge of this Province, is it your view that an increase in the literate population of the countryside would be of assistance in promoting progressive agriculture?—Yes, I think it would be of immense benefit; one way in which it seems to me it would be of assistance is that it would enable the people to utilise to advantage the literature which is produced by the Agricultural Department, and also I think that an efficient system of education would make the people receptive of new ideas.

36,567. And would probably enable the cultivator to guard his own interests more efficiently when he was in contact with either the market or the moneylender?—Exactly; and the petty Government official.

36,568. I assume that you regard literacy as the first objective of a system of primary education?—Yes, and not merely literacy, but literacy which is imparted in such a way as to develop the intelligence of the pupils.

36,569. Do you think there has been any tendency to overdo the notion of an agricultural bias in primary education?—I think so; there are many people who talk vaguely about introducing agriculture in the primary schools, but when one tries to get them to say definitely what they mean by it, it turns out to be very little that is practicable. Undoubtedly there is, especially amongst non-officials who are not educationists, an idea that there is something wrong with our system of education, and their remedy is to make it vocational. Only the other day in the local Council an Honourable Member got up and criticised our system of education because

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it was not vocational; that has become a catchword; people entertain this idea quite honestly and in good faith, but they do not try to follow it up, to work it out in detail and say precisely what they mean by it. I myself have given a great deal of thought to this, and I have never yet met anybody who could tell me what vocational work could be done with any benefit in our primary schools. I remember discussing this with Mr. Moreland who was Director of Agriculture in the United Provinces; I said to him, "Tell me anything connected with agriculture which I can introduce in the primary schools and I shall try to introduce it." He thought for a long time about it and in the end he was able to give me only one lesson; that was a lesson on the method of sowing; we were to teach the children to sow in furrows instead of scattering the seed; that is all he could tell me.

36,570. How about the usefulness or the reverse of garden plots attached to primary schools?—I believe in garden plots for their educational value; I think through school gardening, if well and intelligently taught, we could develop in children a love of nature; I think we could interest them in outside things and we could use the subject as a means of developing their intelligence; but if it is to have these educational results, it must be well taught by men who believe in it and who are themselves interested in nature.

36,571. The giving of nature study lessons is not an easy thing to do, is it?—It is a very difficult thing; even in England one does not come across many teachers in rural schools who teach nature study well, and the man who does teach it well is the man who has a love of gardening; I think everything depends on the spirit of the man who is teaching.

36,572. Do you see any signs of that spirit amongst the teachers in primary schools in this Province?—Very few; I would not say it is impossible to find a certain number of teachers with the right spirit, but we must begin with the training institution and there try to interest the students under training. Attempts have been made to develop school gardening on a more extensive scale; for instance, we had one Collector who was very keen on it and issued the order that there must be school gardens; of course, these school gardens grew up rapidly; but as soon as he went, they died away just as rapidly. We must begin with the training of the teacher.

36,573. I see that on the first page of your note of evidence you point out that there is a certain lack of informed opinion on the District Boards. You suggest, I take it, that the Education Department should be placed in a position to nominate enthusiasts in education on the local Education Committee of the District Board?—Not the Education Department, but the Minister, the Government. I make a distinction. In the old days, before the Reforms, there was a certain amount of external control over District Boards exercised by the Commissioner, the Collector and the Education Department. The Boards resented that outside control, but now that we have a Minister responsible to the Legislature, I do not think in principle the Boards can object to the control of Government, because this Government is a Government responsible to the Legislative Council; therefore I suggest that on the District Board there should be a certain number of members nominated by the Government, and I do not think that this would be at all in conflict with democratic ideals.

36,574. Yes, I might have said the Government instead of the department. On whose advice do you suggest the Minister should nominate members on the local bodies?—I would not say he should do it on the advice of any particular individual; what happens now when the Minister has to nominate non-officials on bodies is that he acts to some extent on his own knowledge of suitable persons in the districts; he asks my opinion, or he may informally ask the opinion of the Collector or Commissioner. He gets his knowledge about men in different ways. If this proposal were adopted, I certainly would make my recommendations.

36,575. In the meantime I take it the position is accurately described on page 18, paragraph 3 of the Report on Primary Education for Boys in the United Provinces, with special reference to Rural Areas, which I see was prepared by the Assistant Director of Public Instruction, Mr. Harrop. Was that for the year 1926?—That was a special report.

36,576. It says: "The transfer of the administration of vernacular education in the districts to a body entirely and directly representative of local interests should theoretically have resulted in an administration better adapted to the needs of the districts, but this expectation has not been realised in practice"—Yes, that is so.

36,577. Is that because of the want of informed opinion on the local body?—Lack of informed opinion and interest in education, and lack of energy to tackle the problems of education in the district. This report represents Mr. Harrop's own view; it is not a departmental view. He recommends an *ad hoc* body corresponding to the old School Board of England and Scotland.

36,578. This is unofficial to the extent that it represents the writer's own views only?—Yes.

36,579. Are you in favour of the creation of education committees *ad hoc*?—In theory I think a body corresponding to the School Board of Scotland would administer education much more efficiently than our present District Boards. But the practical objection, to my mind, to that proposal is that if we take away education entirely from the District Board we take away its most important function. It would leave to the Boards only public health and roads; and I doubt whether the District Board would then attract the type of men required for the general administration of the district. That is why I advocate a compromise in the Education Committee of the District Board.

36,580. It may be that the present arrangement tends to educate the District Boards as well as promote the education of the children; that is rather your view?—Yes; I think that in England, since the passing of Mr. Balfour's Act of 1902, since the abolition of the School Board in England, education has greatly improved; but there is this great difference, that education is practically left to the Education Committee of the County Council. Similarly one finds on the great City Boards of England that education is left almost entirely to the Education Committee of the City Council, the Board itself dealing with only broad questions of policy. So I would rather adopt the English system than the old Scottish system.

36,581. Have you considered at all the advisability of appointing some permanent secretary to the District Boards? Meantime they are conducted entirely by unpaid chairmen, are they not?—They have all paid secretaries in this Province.

36,582. Permanent?—Yes; they are District Board servants.

36,583. *Sir Ganga Ram*: They have also a District Board Engineer?—Yes.

36,584. Does he not act as Secretary?—No. They are separate officers, the District Board Engineer and the Secretary.

36,585. *Sir Henry Lawrence*: What is the secretary's pay?—Rs.300 to Rs.400 a month.

36,586. *The Chairman*: They are not educational secretaries; they are general secretaries, are they not?—Yes, they are general secretaries.

36,587. And there is no special staff dealing with the educational side?—We have in each district an educational officer who is called the Deputy Inspector of Schools who is the adviser of the Board in educational matters. He is a Government servant. So his position is rather anomalous. He and

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the Sub-Deputy Inspectors, of whom there are four or five in a district, are the district officers of the department. At the same time, the Deputy Inspector acts under the control of the Chairman of the District Board as the Board's executive officer. I think that vernacular education would benefit greatly if the position of the Deputy Inspector were strengthened, if he was made a gazetted officer, and if he was *ex officio* secretary of this education committee which I advocate. Also I think he should have his own separate office to look to the details of administration. In the Punjab the office of the district inspecting staff is paid from Provincial funds and the clerks are Government servants. In this Province the clerks are all District Board servants, and for education we usually get the worst; those who cannot do anything else are put in the education office.

36,588. So that to that extent you have dual control?—Yes, we have. We supervise the schools through this Government staff, and at the same time the Board use them for their administrative work in education.

36,589. You regard that as the best arrangement in the present stage of development of your system?—Yes, with the modifications, I suggest.

36,590. On page 309 of your note, you say, "Efforts are being made in these Provinces to improve the middle school by the introduction of agriculture and manual training in the curriculum. Other changes aiming at linking up the work of the Education Department with the work of the Public Health and Co-operative Departments are under consideration." Have those suggestions been matured?—No. We have at present a committee consisting of certain officers of the department going into this question, and the idea I have in view is this: that we might, in the Normal School, impart to the teachers a course which would include instruction in such subjects as public health, the principles of co-operation and the main developments of the Agricultural Department; the object of that course would not be to equip these teachers for teaching these subjects in the schools, but to give them a background of knowledge which, I think, would be desirable in the case of men who are to teach in village schools. Whether we can devise a course which would be educationally sound and suitable for them is another question. That is what we shall have to look into very carefully; but that is the general idea at the back of our minds.

36,591. Do you think that a local schoolmaster may well be the secretary of the local co-operative society?—Yes. I know a little myself of the work that would be involved; but he is a suitable person for work of that kind if it does not interfere with his ordinary school duties.

36,592. I think there has recently been passed a compulsory Education Act in this Province?—Yes; it was passed last March, about a year ago.

36,593. That is a permissive Act applied district by district?—The Act permits a District Board in any area however small, even a village area, to introduce compulsory education.

36,594. Do you think the moment has come for compulsory education in this Province?—I think so, if the Act is worked in the right way. There is great waste at present in primary education as we mentioned in the memorandum which we submitted to the Commission. There is a rapidly diminishing enrolment from the infants' class to the higher classes of the primary school. Of every 100 boys who enter the primary school only 16 complete the full primary school course. So the first object of compulsion would be to ensure that the children who attend the school stay there until they get the benefit of it. The second object would be to ensure regular attendance. At present, even the limited benefit the child might get from attending the infants' class is lost on account of irregular attendance and I understand that in the Punjab, where they have introduced their compulsory Act in a large number of areas, the Act is being used primarily for the purpose of ensuring that pupils who are now at school will stay

there, not so much from the point of view of bringing in outsiders; that of course is the ultimate object, but in the Punjab I understand the Act is used for making the present system more economical by getting a better return for the money spent.

36,595. Have you ever considered the possibility of a scheme according to which parents will be in a position to contract in to a system of free education on the understanding that they would pay a certain fine if they take their children away before the approved moment?—I have never had that suggestion put to me.

36,596. The fine would be on a diminishing scale so that the longer the parent refrains from withdrawing his child the lower will be the fine, until it would finally disappear at the point where the system would be completely free?—I doubt very much whether it will work in practice. Even in Municipalities where there is a better educated public opinion than in the rural areas we find that it is very difficult to get the Boards to inflict any fines at all in their areas.

36,597. You mean the local authorities do not inflict the fines?—No; it makes the members unpopular. They ask for compulsion and as soon as they get it they make it ineffective, because they will not use their powers under the Act.

36,598. In the more backward tracts, any attempt to introduce compulsion will be doomed to failure, will it not?—I think it depends on the capacity and energy of the people who are working the Act. It does not depend so much on the children themselves as on the people who are working the Act and, while liberal exemptions must be given, I do not see any insuperable difficulty even in backward tracts in working a system of compulsory education. I think that was the experience in England when compulsion was introduced. The success of compulsion was not due so much to the willingness of parents themselves to have compulsion applied as to the fact that the people who were working the Act had the public spirit and the energy to insist on it being applied and the people had to respond.

36,599. *Sir Henry Lawrence*: What is the experience in any place in this Province where compulsion is now in force?—I find that it depends on the energy of the Board. There are some Municipalities in this Province where compulsion is being worked fairly well because the Board is not afraid of imposing fines; there are others where it is not working well because nobody will face the odium of levying fines; and in one Municipality where compulsion was a failure we threatened the Board and said that if they did not apply the Act we should consider the question of withdrawing it altogether. They did not like to face this alternative and they pulled themselves together, with the result that the next year the results were much better.

36,600. *The Chairman*: I do not quite reconcile your answer to Sir Henry Lawrence with what is stated on page 309 of your note: "The Primary Education Act permitting District Boards to introduce compulsory education in rural areas was passed by the Legislative Council only in February, 1926, and received the assent of the Governor-General on April 21, 1926. No Board has yet applied the Act."?—There are two Acts. There was one Act which was passed in 1919, that Act was for Municipalities and the Act passed in 1926 was for District Boards. We have compulsory education now to some extent in about 25 out of 80 Municipalities.

36,601. Then, to turn to your middle school system, you say, at the bottom of that page: "Efforts are being made in these Provinces to improve the middle school by the introduction of agriculture and manual training in the curriculum." Have you made any changes recently or are you contemplating any changes?—We have actually introduced the teaching

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of agriculture in ten middle vernacular schools and we propose next year to introduce it in ten more; the teachers for the additional ten are now under training. We have introduced manual training in fifteen schools and we propose to extend it to fifteen more next year.

36,602. How long has the agricultural training been in existence in these schools?—It was introduced only last year and we cannot say yet whether it is to be a success or not.

36,603. What exactly is the system in those middle schools?—We have a course in agriculture which was drawn up in consultation with the Agricultural Department. The subject is taught for about six hours a week in each of the classes V, VI and VII. We do not aim at turning out expert agriculturists but rather at giving a training in nature study on a big scale, a kind of training which will interest boys in agricultural work, give them, we hope, some respect for work done by the hands, and perhaps pre-dispose some of them to an agricultural life. They may wish to go to a school like the Bulandshahr school if they have been through a course like this.

36,604. Are those all middle vernacular schools?—Yes.

36,605. Are there any English classes in those schools?—In some middle vernacular schools, we have special English classes.

36,606. So that a boy might go higher up if he wished?—Yes.

36,607. Do you find the schools where English is taught very popular?—We have not had sufficient experience of them yet to say. There is undoubtedly a great demand for the teaching of English in middle vernacular schools and we now teach it in about 100 out of 500 schools.

36,608. In the case of the ten schools in which agricultural courses have been introduced, what land is available?—Five acres.

36,609. And stabling?—Just a shed.

36,610. For working cattle?—Yes.

36,611. One pair of bullocks?—Yes.

36,612. Are they on irrigated or unirrigated land?—Some on irrigated and some on unirrigated land. The sites are chosen by the Agricultural Department.

36,613. Is there a graduate of the Agricultural College attached to these middle schools?—No; we take an ordinary teacher from the middle vernacular school, that is, a man who has been through the middle vernacular school himself and has been two years at the normal school, and then we send him for a ten months' course to the Bulandshahr agricultural school. We choose a man who has had some connection with the land.

36,614. *Sir Ganga Ram*: Has he not taken a degree as Bachelor of Teaching?—No; he is just a vernacular trained teacher.

36,615. *The Chairman*: Is there a special course at that school for these teachers?—Yes.

36,616. So that they do not attend lectures at any College of Agriculture?—Only at the Bulandshahr school, which is the type of school which we think is the most suitable for the training. They take a ten months' course there.

36,617. Have you formed any view as to whether that training will equip these teachers to manage even so small a farm as one of five acres?—I do not think they will manage it well. I am not an agriculturist, but I do not think the training is sufficiently thorough for that. All I hope to do in a course like this is to interest boys in agriculture sufficiently to stimulate them to go on to a school like the Bulandshahr school and receive there a training which will enable them to manage small farms.

36,618. Do you not think that there is a possible danger if only five acres of land are attached to the school that the confidence of the people in the agricultural side of education may be somewhat shaken?—Yes; but if I find that, I shall recommend that they be stopped. I hope that this will not be the case. It is only an experiment that we are trying now.

36,619. Would you like to say anything about female education?—Female education is extremely backward. I think it has received very little attention either from the Legislative Council or from local bodies. I think that it has been greatly neglected. A great obstacle to progress is the difficulty of securing teachers. Another is the general apathy of everybody towards female education. I have been struck by the fact that during my six years on the Legislative Council there was not a single discussion on female education. One finds this apathy in the District Boards themselves. We offered the Boards to pay half of the cost of any scheme for spreading the education of girls; we offered half the cost of improving the pay of teachers, of buildings and equipment and of improving training facilities, but we got little response. I think the reason is partly the poverty of the Boards, many of our Boards being on the verge of bankruptcy; every thousand rupees tells; but there is also the general indifference to girls' education.

36,620. There are no lady members of Council?—No, I wish we had some. I do not think that women will ever come into their own until we get women members of Council.

36,621. That is not a matter in which your department can do very much, can it?—No.

36,622. Turning again to the report by Mr. Harrop, it is pointed out on page 47, paragraph 2 thereof, that "the problem before these Provinces is not as it is in the West to give adults courses of instruction beyond the elementary, but to make illiterate adults literate." And then, after setting out the arguments, the writer comes to the conclusion that "any attempt to spread adult education by means of subsidising teachers in rural areas for night courses would probably lead to disappointment"; and he suggests, in the circumstances, "the best course is to open schools for adults only where there is an assured demand for them. The scheme adopted by the Punjab of forming co-operative adult education societies offers the possibility of such an assured demand, and the scheme has been brought to the notice of the Registrar, Co-operative Societies, and the Education Department by the Oakden Committee on the co-operative movement in these Provinces." Do you agree with that view?—Yes, I do.

36,623. And then Mr. Harrop suggests also that night schools might be started as an experimental measure in the Normal Schools, that is to say, illiterate adults living in the neighbourhood of Normal Schools should have a chance of going in the evenings and receiving instruction? Do you agree with that?—Yes.

36,624. *Sir Ganga Ram*: Have you studied the latest method of rural education in the Punjab?—I have read the reports of the Punjab Education Department.

36,625. There we have started giving one year's course in the Lyallpur Agricultural College to all rural teachers, and a Normal School has been established there?—I think what they do there is this: they train at Lyallpur the teachers who are to teach agriculture in the middle vernacular schools, but not all teachers of rural schools.

36,626. I am not quite positive on that point; you may be right; anyhow, you have no such system here?—We have. We send our teachers not to the Agricultural College, but to the Bulandshahr School.

36,627. Are the Deputy Inspectors of Schools under your department or under the District Boards?—They are servants of Government in the Education Department.

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36,628. If the Deputy Inspector was appointed as Secretary to the Education Board, that would mean that he would be serving under two masters?—That is so: but the present position is anomalous. At present he is to some extent under the control of the Chairman of the Board.

36,629. In the Punjab either the District Engineer is the Secretary or some honorary worker is the Secretary; and, of course, the District Engineer has his own department. I am only telling you this for your own information. I do not think that both the Secretary and the District Engineer are paid?—My suggestion was that the Deputy Inspector should be Secretary to the Education Committee only, and I believe that if he were made Secretary his influence for good in the district would be greater than it is now. At present he has to work through the Secretary of the Board, who is not an educationist. With regard to the question of nature study, you will pardon me if I tell you that the words "nature study" are not understood by the Education Department of these Provinces. Nature study means taking the boys out into the open fields and showing them the various kinds of crops and how the fields are ploughed. But simply providing five acres of land and a pair of bullocks to the school would only mean extra income to the teacher by way of affording him the opportunity of obtaining his kitchen vegetables free.

36,630. We have found that is the case, and therefore, we have not followed that process of attaching a 5-acre plot to each school. Nature study properly means that you should take the boys out into the fields for a walk, show them the fields, and the crops growing in them, and explain to them why the crops in certain fields are very well and in others they are not, and that sort of thing. The teacher who has received a one year's course ought to be able to know all that?—I do not agree with your definition of nature study although what you say is nature study may be included in the course.

36,631. You mentioned the difficulty of the cost of buildings. Can you give me any idea of the cost? Have you any standard plans?—Yes.

36,632. Have you studied the standard plans of the Punjab?—Not recently, but I studied them three or four years ago.

36,633. Do your plans differ much from those of the Punjab?—Not much.

36,634. Do your school buildings differ from those of the Punjab as regards the cost and the plan?—They are much the same. The cost of a primary school building in these Provinces, that will stand the weather and will not need continual patching, is about Rs.4,000.

36,635. I think I can tell you how to reduce it to one-quarter of that?—I wish you would.

I have got the plans from England, and the Punjab Government have decided to set up one school of each pattern as a model. I shall speak to you about it afterwards.

36,636. Do you know what proportion of the income of a District Board is spent on education? Is there any rule about it?—There is no rule about it.

36,637. They may spend the whole of their income on education?—The position is that the total expenditure on vernacular education is about Rs.90 lakhs a year, and the Boards themselves contribute about 30 lakhs.

36,638. That is for general education?—It is for vernacular education.

36,639. I only want to know whether there is any proportion which is laid down?—We have not laid down any proportion.

36,640. There are no Government rules as regards that?—No. In 1919, when we went in for a big scheme of educational expansion, we gave the Boards the whole of the extra money required, and since then, for

the improvement of the pay of teachers, we have given them the whole of the extra money required.

36,641. You made some remarks about ignorance about vocational education. We are also just on the threshold of improvement in that respect. One aspect of vocational education which is most necessary, which I have also represented to the Punjab Government, is to train the boys to draw to scale, so as to train their eye to the proportion of a thing. That can easily be introduced?—I do not believe in that for the primary school.

36,642. I am talking about classes above the middle school, the high school?—We have no high schools under District Boards in rural areas.

36,643. In urban areas, would you be in favour of introducing scale drawing?—To some extent. I would not lay too great stress on it.

36,644. Have you got the B. Com. degree here?—Yes.

36,645. Do you make any preparation for it from the high school upwards?—Yes; we have it in the high schools and the intermediate colleges.

36,646. You have no normal school for women teachers?—We have.

36,647. Can you not train a sufficient number to meet the wants of the people?—Not nearly enough for the needs of the country. The girls are not coming forward for this work in sufficient numbers.

36,648. Is that on account of sentiment?—It is not altogether sentiment. As you know, it is not easy for a girl to settle down in a town by herself and live alone.

In the Punjab we have started Hindu widows' homes for such teachers, and within the last four years we have spread 50 women teachers all over the Punjab. I get letters from some of my friends in this place, and even from the Benares University, complaining that our girls will not go to the other Provinces. If you have a Normal School on those lines, you can easily train them. Hindu widows require something to do, and I may tell you that we turn out 16 women teachers every year, and there is a still greater demand.

36,649. *Sir Thomas Middleton*: The administration of your work locally takes the same form as in England. You have got the District Board, corresponding to the County Council, and the Education Committee corresponding to the English Education Committee. But I understand from what you say that here the District Board gives much less power to the Education Committee than the Education Committee has in England?—That is so.

36,650. In England, the Education Committee is practically independent, except for finance?—Yes; in practice it is.

36,651. The County Councils do not interfere?—No.

36,652. To carry on the business in the same way as it is done there, you agree that it is essential that there should be a separate Secretary for the Education Committee?—Yes, undoubtedly. It would be an immense benefit to education if we had a separate Secretary.

36,653. Would you agree that the progress made by Education Committees in England is largely dependent on the fact that they have had very competent Secretaries?—Yes, and partly to the common sense of the English people, which has resulted in their delegating to their executive officers a good deal of power. In our local bodies the authority parts with power to its executive officers with great reluctance. Their whole time is taken up in discussing small questions of administration.

36,654. Whereas, in England the Education Secretary, in consultation with his Chairman, has great power?—Yes. It is a matter I specially looked into when I was last home on leave, and I ascertained that, although the Secretary has no statutory powers, in practice he has very considerable power in every one of the big educational bodies.

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36,655. What salary will be required for your Education Secretaries in the United Provinces?—My proposal is that the present Deputy Inspectors be made Secretaries of these Education Committees, and that they be gazetted officers on salaries of about Rs.200, rising to Rs.500.

36,656. You say that your policy is to take up more rural schoolmasters from the families of real agricultural stock. Do you get any considerable proportion of them from agricultural stock in the United Provinces at the present time?—I should think we get between 80 and 90 per cent.

36,657. What about the quality of the men that you get from agricultural stock. Is it at least as good as you get from any others?—I should correct my statement by saying that the men are drawn from the rural areas. By agricultural stock, I mean men who have some connection with the land, not necessarily the sons of agriculturists. Their quality is as good as that of others.

36,658. We have heard the falling off of the attendance in the primary schools ascribed to poor teaching, apathy on the part of the parents and to the value of the boy's work to the parent. To what extent is the last, the value of the boy's work to the parent, important in the United Provinces?—I think it is of great importance, because the people need their boys for such tasks as herding and light tasks about the home.

36,659. And they want them for seasonal labour?—Of course, you cannot expect much labour from children of six to eleven, but they do little odd jobs.

36,660. Is any attempt made to make the school holidays coincide with the busy seasons in cotton picking districts?—We do. In our rules which we issue for the guidance of District Boards we say that the two principal holidays of the year should be given at the two harvests.

36,661. Do the periods of holiday in fact vary much in different parts of the Province?—No, not much.

36,662. We have heard, in some Provinces, that one great problem is the unemployment of young graduates. Have you got that as a serious problem in the United Provinces?—It is becoming more serious every year. Now that we have four Universities, and will soon have a fifth, the question of the unemployment of graduates is a serious one.

36,663. *The Raja of Parlakimedi*: Will not the efficiency of a school increase if you have better qualified teachers?—Undoubtedly.

36,664. You say that in certain schools the teaching is inefficient. Cannot they be forced to have better qualified teachers?—We do lay down that only teachers who are trained will be allowed to draw certain rates of pay, and by giving the Boards grants based on the qualifications of teachers we indirectly encourage them to employ trained teachers, but our system of training could be greatly improved if we had more money to spend on it.

36,665. Does not the Act here allow you to levy an educational cess?—No.

36,666. Do you not think that it would be a good thing to introduce such a thing?—I think it would be a good thing to get the money, but I doubt whether an educational cess would be a measure which would be supported by the Council.

36,667. Other Provinces are doing it?—It is rather outside my sphere, how to raise money. I need it badly, but I do not know how it should be raised.

36,668. Do you find the Local Boards evince much interest in the improvement of education?—My complaint is that there is not nearly enough interest on the part of the Local Boards in the really important problems of education. They are much more interested in such things as the transfer

of teachers and the promotion of particular individuals than in the real problems of education.

36,669. Do you camp out in the districts occasionally?—I have no time for it. I do visit particular places, but I have no time for regular camping, because I have to spend three months of the year in the Legislative Council, and the department is growing rapidly.

36,670. Were you able to move about more before the Reforms?—The Director then did more touring.

36,671. Do you not keep in touch with at least some of the headquarters?—Yes, I go to the headquarters of districts. I thought you meant regular camping with tents through a district.

36,672. Do you meet the Chairmen of District Boards?—Yes.

36,673. Have you tried to create more interest in education in such people?—I always tell them what I think the needs are.

36,674. Do you feel that that has some effect upon them?—I have not noticed any. I told the Council the other day that I thought education was dying in the districts on account of the apathy of the District Boards, and there were several members of District Boards present. I do not think that anyone disagreed with me on that. They all realise it. There are honourable exceptions, of course, and some of the Chairmen are keen men, but the average member of the District Board is, I think, not sufficiently energetic or interested in education.

36,675. In your jurisdiction have any of the Municipalities taken to this compulsory education?—Yes, 25 out of 80.

36,676. Are they working satisfactorily?—Some of them fairly so.

36,677. For how long have they been in existence?—For about three years, most of them.

36,678. Have any of them night schools?—We have night schools in about ten municipalities, about twelve schools in each.

36,679. Are they for adult education?—Yes, for illiterates over the age of twelve, who cannot attend the day school.

36,680. Is there a difference between the attendance at day schools and night schools?—Our experience varies. In some Municipalities, the attendance at these night schools is good: in others it is irregular. But on the whole in many Municipalities they are a success. The main reason for that is that they can be easily supervised; also the people in Municipalities are keener on attending, and the pupils are largely workmen who want to learn to read and write because this knowledge pays them in their work.

36,681. Are these night schools popular in those places where there is a demand for boy labour? I mean, on the last page you say that it is difficult to get boys for education because they are needed at home to help their parents. Do you think it would solve the situation if they had these night schools in those places?—I do not think they would attend.

36,682. Not even the night school?—I do not think so.

36,683. Do you think when their parents return, they will not be sent back to school?—I do not think so. I do not think there is such keenness amongst them for education that they would attend. It is either very cold or very hot in this part of the world, and the seasons between are the harvest seasons.

36,684. What are the working hours in the night schools, in the evening?—From 6 p.m. to 8 p.m.

36,685. *Professor Gangulee*: Does the Primary Education Act of 1919 apply only to Municipalities?—Yes.

Mr. A. H. Mackenzie.

36,686. Not to District Boards?—No.

36,687. So it was necessary for you to introduce another measure to enable the District Boards to introduce compulsory primary education in rural areas?—Yes.

36,688. On page 72, paragraph 348 of the Report on Agriculture in the United Provinces, you say the measure is the complement of the Primary Education Act of 1919? Are you referring to this District Boards Primary Education Act?—The District Boards Act is a complement of the Municipalities Act.

36,689. Until 1926, there was no Act which permitted the District Boards to introduce compulsory education?—No.

36,690. So you cannot really blame the District Boards for not taking an interest in compulsory education?—I have not blamed them on that account. It is too early yet to expect them to do so.

36,691. At the present time there are no primary schools managed by District Boards where they are trying to introduce compulsory education?—No.

36,692. Your experience of compulsory education is confined to the Municipalities?—Yes.

36,693. *Mr. Kamat*: Even now the draft rules under the Primary Education Act for the District Boards are still under consideration. They are not yet finally published?—They have been published now.

36,694. Only recently?—Yes.

36,695. Up till now the District Boards could do nothing because the rules were under consideration?—That is so. I am not quite sure whether I have not been misunderstood. I am not sure whether the suggestion in these questions is that I blame the District Boards for apathy because they have not introduced the Primary Education Act. I do not blame them for apathy on account of that. I blame them for apathy for not working the voluntary system efficiently.

36,696. *Professor Gangulee*: Do you agree that the voluntary system is really a very wasteful system?—Yes, because we get so few boys who complete the full primary course.

36,697. I should like to hear of your experience of primary schools in the municipal areas where compulsory education is being tried. First, with regard to attendance, do you find the attendance in these schools more regular than it was before?—Yes, in some of the municipalities it is.

36,698. Has there been any improvement in the quality of the teachers?—No, I would not say that they are better than our District Board teachers.

36,699. I am trying to compare your voluntary system with your compulsory system?—I think, on the whole, we have better teachers under the District Boards than under the municipalities.

36,700. So in the compulsory education system in the municipal areas they have teachers who are not up to the standard, if there is a standard?—Yes, that is an unsatisfactory feature.

36,701. Is the curriculum under the compulsory system any better than the curriculum under the voluntary system?—It is practically the same: the three R's, a little geography, and a little nature study where the teacher is competent, and physical exercises.

36,702. One of the features of the voluntary system is that instruction is worse in the lower classes, and from your description of the compulsory system as it is in vogue here in municipal areas, I find the same thing prevails, that the instruction is worse in the lower classes, because you

say your teachers are not up to the mark. The curricula are just the same?—Instruction in the lower classes is more difficult than in the higher classes.

36,703. That is so?—One gets children at different stages, and it is difficult to keep them all together, and teaching the elements is more difficult than teaching children in the third or fourth class.

36,704. Has any provision been made under this Compulsory Education Act for having any fund or cess to finance the scheme?—No. The Government pay the Boards two-thirds of the extra cost. The total extra cost to make the scheme universal in the municipalities of this Province would be another nine lakhs, of which Government would contribute six lakhs and the Boards three lakhs. It is quite a feasible proposition in the municipalities.

36,705. In Bengal we had to impose an education cess to meet that demand?—That, I think, is a proposal.

36,706. With regard to the agricultural middle schools, are they under the Education Department?—Yes.

36,707. Is there any middle school other than the agriculture middle schools where an attempt is being made to give some sort of agricultural training? I do not mean the sort of school you have in Bulandshahr; that is definitely an agricultural middle school. Are there no ordinary middle schools where some agriculture is taught?—These schools I have been talking about are middle schools teaching some agriculture. They are not agricultural schools.

36,708. How do these middle schools where agriculture is taught compare with the agricultural middle schools?—They have different aims altogether. The purely agricultural middle school aims at turning out trained agriculturists.

36,709. I know what their aims are. What I want to know is, whether the pupils take more interest in agriculture through going to these middle schools?—I cannot say, because we have not had them going long enough.

36,710. Who teaches agriculture in the ordinary middle schools?—A trained teacher who, after receiving his ordinary educational training, is sent to Bulandshahr for a ten months' course in agriculture.

36,711. Who teaches agriculture in the agricultural middle school at Bulandshahr?—A graduate of the Agricultural College.

36,712. On page 309 you talk of co-operation, of changes aimed at linking up the work of the Education Department with the work of the Public Health and Co-operative Departments. I understood you to say to the Chairman that there was a Committee appointed by Government to deal with that question. Is it still sitting?—Yes.

36,713. The report is not available yet?—No.

36,714. Until now there was no co-operation?—We have had co-operation to this extent, that we teach hygiene in our Normal Schools and we include a certain number of lessons in health matters in our ordinary readers. We have arranged to try experiments next year in adult education with the help of the Co-operative Department.

36,715. Have you any facilities for coming into contact with the educational authorities of other Provinces?—No. For the first time for many years this year all the Directors of Public Instruction met at Delhi; that was a very helpful conference.

36,716. Do you think such conferences are helpful?—Yes, very helpful.

36,717. It brings you in touch with what other Provinces are doing?—Yes.

Mr. A. H. Mackenzie.

36,718. Is that conference to be held annually?—I do not know.

36,719. Have you been to Moga?—No; Mr. Harrop went there on behalf of the department to see what they were doing.

36,720. Do you know of the experiment that is being undertaken in the Punjab with regard to the utilisation of the Co-operative Department for educational purposes?—Yes, I have read an account of what they are doing. They run many night schools under the general supervision of the Co-operative Department, but I believe they experience the same difficulty that I anticipate here as to regularity of attendance; I understand they had an enrolment of about 80,000 students at these adult schools in the Punjab, but less than 10,000 literacy certificates have been issued. It may be rather early yet to judge of the results.

36,721. *Mr. Calvert*: But 10,000 is better than nothing, is it not?—Oh, yes; but it seems to me that the system is wasteful; unless one makes most of these students literate the system is wasteful.

36,722. *Professor Gangulee*: What was the nature of the discussion at this conference which has just been held at Delhi; was it chiefly on rural education?—No, we discussed the Universities, secondary and rural education; we certainly talked a lot about rural education, but I think we covered the whole range of education.

36,723. Was it a combined conference of officials and non-officials?—No, it was only the Directors and some Ministers.

36,724. On what occasions do you have to approach the Education Commissioner to the Government of India; are you at all in touch with him?—No, the Government of India have very little control over education, so that we do not come in contact with him much.

36,725. There is not much contact?—No, there is no need for it now that education is a transferred subject.

36,726. Would you like to see such a relationship re-established with the Education Commissioner?—I think the conferences are very useful.

36,727. *Mr. Calvert*: Have you ever found a rural teacher weeding a school garden?—I have never actually seen one doing it, but I believe some do it.

36,728. Have you ever known a village teacher who keeps his own garden?—No, not in the way that an English teacher does.

36,729. They are not naturally inclined that way?—No; they have not a natural love of gardening.

36,730. One witness has given us figures for literacy in this Province during the last forty years; he has pointed out that in 1891 the literacy was 3·2 per cent., and in 1921 it was 3·7 per cent. Is that fairly accurate?—I could not say. These figures, I suppose, are based on the census.

36,731. Yes?—The figures that interest me more are the percentage of the school-going population at school rather than the figures of literacy.

36,732. But do you think this will be fairly accurate?—I should not like to say; I do not know.

36,733. Have you ever worked out the normal mortality among literates in the Provinces?—No.

36,734. That is to say the number you must replace every year to maintain the percentage?—No.

36,735. Compared with the number turned out by the fourth class?—No, I have not.

36,736. We have been frequently told, as you will be able to guess, that the curriculum in schools gives a boy an aversion to manual labour. The root cause might be in the curriculum, or the teacher, or the boy, or perhaps in the manual labour. Do you think the teacher or the curriculum have

much to do with it?—To begin with, I do not believe it; I do not think the curriculum does give a boy an aversion to manual labour.

36,737. That statement appears in practically every sheet of evidence we get?—I do not understand it. Our curriculum is not very different from the curriculum of a Board school in Scotland or England; one does not find the same charge being made there. I agree that it would be an advantage to have an element in the curriculum which would give boys a respect for work done with the hands, and one could I think have a subject like manual training in the middle schools, but I do not see what you could do in the way of manual work in the primary school, that is, for children between the ages of 6 and 11. I know that what you say is said by the great majority of people who talk about education, but I personally do not think it is a fair criticism.

36,738. It seems to be very difficult to get down to the root cause of that statement?—I think people assume that because boys are four or five hours in school they get a distaste for manual work. I do not see why it should be so; it is not so in my own native country.

36,739. Of course, the distaste might have been there first?—I do not see that you can expect much manual work from these little boys; they are little more than infants; I do not know what manual work people expect of boys between the ages of 6 and 11; they cannot do much more than herd the cattle, gather sticks and do a few little jobs like that.

36,740. You cannot suggest a royal road to avoid that criticism?—No; as I said, I believe our system of education would commend itself to the people if we did well what we are trying to do.

36,741. You lay great stress on the teacher?—Yes, I think the training of the teacher is the crux of the whole problem of improving our elementary schools.

36,742. You know, of course, that in the Punjab we are trying to teach rural economy to the teachers so as to instil in them the best element of the Moga system. Is anything being done here on those lines?—As I said, we are considering whether we could have in our normal schools, with advantage, a course in what I think you call rural economics in the Punjab; the object of that course would be to interest the teacher in developments for the improvement of the villagers, and to make him sympathetic towards such movements, because he is usually the only educated man in the village.

36,743. Do you think your primary school teachers at present take any interest in village life?—I think so, in the way that everyone connected with a village does; as I said, 80 to 90 per cent. of them are drawn from the villages; they have village interests; but I want to go a little further; I want to give them a knowledge of what outside agencies are trying to do for the improvement of the villager.

36,744. You have probably read a book called "England's Green and Pleasant Land", in which it is said that the only hope for the English village now is in the village teacher. Do you think there is any hope in this country of making the village teacher the centre of all your uplift movement?—In time it will come. Do you mean on the lines recommended by the missionary deputation that visited India?

36,745. Something similar to that?—Yes, in time it will come, but I do not see that we can do much in that way until we have much better school buildings than we have at present. The school house should be the centre of these social activities, but about half of our school buildings are ill ventilated, damp buildings which are very unsuitable for any teaching purpose.

36,746. *Professor Gangulee*: If you had a good building, you could develop it into a community centre?—I think the provision of a good building must be the first step.

Mr. A. H. Mackenzie.

36,747. *Mr. Calvert*: Do you get girls attending boys' schools to any extent in this Province?—A fair number; I cannot remember the figures, but I should think we have got about 30,000 girls in boys' schools.

36,748. Under male teachers?—Yes.

36,749. That is quite hopeful?—The success of the scheme depends very much on individual officers; some officers are keen on it and it goes ahead in their Divisions.

36,750. Could you give a rough figure of the cost per pupil in the middle school?—It is about Rs. 23 a year.

36,751. And, adding on the extra charge for this agricultural teaching, what would it come to?—The annual cost of agricultural teaching, the recurring cost, would be about Rs. 700 a year; that includes contingencies and the pay of the teacher. There would be 90 pupils, 30 in each class; the extra cost of the agricultural training would be about Rs. 700 for the school.

36,752. So that this system of teaching agriculture in middle vernacular schools is not expensive?—No.

36,753. Is this agricultural teaching in the middle schools to be confined to the vernacular middle schools?—Yes. Although it is called agricultural teaching, I tried to make it clear that I do not regard it as teaching which will turn out trained agriculturists.

36,754. Do you think your department inadvertently encourages the leakage in the primary schools by laying stress on gross numbers on the rolls instead of on numbers in the fourth class?—How do you mean, laying stress?

36,755. In your annual reports commenting on the number on the rolls?—No, we are always drawing attention to the diminishing enrolment; we do not wish to hide it; it is one of the things we wish to advertise in order to make the Boards and others conscious of the fact that there is so much wastage.

36,756. The really important thing is the number of boys passing through the fourth class, is it not; that is what you are aiming at?—Yes.

36,757. Sometimes you point out in your reports that the number of boys on the roll has gone up by a certain number which represents so much per cent. in the year?—In other parts of the report you will find I am lamenting the fact that there is so much wastage.

36,758. In answer to the Chairman you were not very hopeful about a system of contracting in; I suppose you have heard of my experiment in the Punjab of compulsory co-operative education in which they all sign an agreement?—Yes.

36,759 I suppose there is no hope of that system being adopted here at present, is there?—I do not think so.

36,760. It is just to prepare the ground for the compulsory system?—I should doubt very much whether it could be adopted here.

36,761. *Mr. Kamat*: Speaking about manual work, have you had in this Province any idea of holding exhibitions of children's work?—Yes, we have exhibitions. Last year we had one for the Allahabad Division and two years ago we had one for the Agra Division; we have one for the Gorakhpur Division this year.

36,762. Are the exhibits sent up by the boys or girls fairly good?—Yes.

36,763. So there is a taste for doing manual crafts if there is some man of imagination to infuse such ideals in this regard amongst children?—

You mean as regards manual work? I think it must be done in a systematic way. I do not think merely holding exhibitions would be a sufficient inducement. We have got to train the teachers and supply equipment and so on.

36,764. Now about your suggestion in regard to school committees of the District Boards for promotion of elementary education? Since the passing of the Compulsory Education Act last year has this Province thought over the question of overhauling the District Local Board Act?—If you mean by Province the Government, no; they have not considered the question of amending the Act.

36,765. They have not considered the consequential amendments to the District Local Board Act involved by the passing of the Compulsory Education Act?—The Compulsory Education Act does not require any consequential amendments.

36,766. I am speaking subject to correction; but I think, in the Bombay Presidency, the Local Boards Act has been overhauled recently, and school committees, which you suggest, are now almost necessary for the promotion of elementary education. I wonder whether your Government has thought of the necessity of having similar consequential legislation for the District Local Boards?—We have not yet thought of legislation. The Primary Education Act was passed as the last Council was dying and the new Council has just come into existence. The Government have not yet thought of any new legislation.

36,767. The position has not yet been considered by the Local Government?—No; but we have decided to appoint a committee which will include members of the legislature and members of the Education Department, to examine the working of the education committees of District Boards.

36,768. Speaking of the Municipal Act, I believe under the constitution of the Act there is a provision for nominating a certain proportion of the total number of members by Government?—On the Board itself, not on the committee.

36,769. Yes, on the Board itself; it cannot be on the committee. Government have the power to nominate?—Yes, one or two.

36,770. Not one or two, it must be a definite percentage of the total number, say one-fifth?—The number of nominated members is two in the case of most Municipalities and in the case of four Municipalities one-third of the number of elected members.

36,771. The same thing happens in regard to the District Local Board Act. There again Government have the power to nominate a certain proportion?—They nominate two persons to represent special interests like the depressed classes.

36,772. And a certain number of officials?—No.

36,773. You have at all events the power of nomination?—Nomination to the Board to a small extent.

36,774. If it is the school committee, at least under the Municipal Act the Government has the power to co-opt an expert, say the Principal of a college or the Headmaster, on the School Committee; that is also allowed?—Co-option is by the Board, not by the Government.

36,775. Is advantage being taken of these provisions under the Act under the existing circumstances?—Not to co-opt educationists on the Education Committee.

36,776. In other Provinces this has been done for any number of years, as far as I know?—In this Province they do not co-opt any practical educationists on the Education Committee.

Mr. A. H. Mackenzie.

36,777. In fact even the idea of co-opting lady members has also been mooted in some Provinces and is very favourably considered?—It may be so.

36,778. With regard to your second suggestion for the training of teachers in Normal Schools, have you not got any training colleges of your own?—We have eight Normal Schools and we also have training classes in the districts.

36,779. Not a full-fledged training college?—The normal schools are training colleges for vernacular teachers. We call them schools. They give a two-years' course of training to students who have passed through a middle vernacular school.

36,780. So, when you speak of the improved system of training teachers you want some improvement in these Normal training schools?—Yes, and in the district training classes which give one-year courses for primary teachers.

36,781. But it is within the competence of your department?—Yes, if we get more money.

36,782. On the last page of your note you make a very interesting remark: "It is significant that in an Indian village the building which commands most respect is the police *thana*, whereas in a Western village it is (next to the church) the school". What is the pay you give to your village teacher here?—A trained teacher begins at Rs.15 and rises to about Rs.20 as an assistant master; as a headmaster his pay is from Rs.23 to 30; that is for the teacher of a primary school. An untrained teacher gets Rs.12.

36,783. In any case he gets less than a rupee per day?—Yes.

36,784. In England what is the average salary of the village school teacher, a respectable amount?—It compares well with that of a small shop-keeper.

36,785. That makes all the difference perhaps in the respect which they command in the village?—I do not think, having regard to the standard of living and to the pay of men of similar qualifications in other walks of life, that our teachers are paid badly. We spent recently 22 lakhs of rupees recurring in increasing the pay of our teachers. Before that increase they were badly off. I think their pay is now adequate; I have no complaint now about the pay of the teachers.

36,786. It all resolves itself into a question of more funds and more funds. There is another remark of yours: "The only effective means of making boys contented with a rural life is to make the land attractive to them by improving the economic condition of the villagers". Here again I think we are moving in a circle. We cannot send boys to the village because agriculture is not sufficiently paying, and agriculture is not sufficiently paying because educated agricultural graduates do not go back to the village. Can you suggest a method by which we can get out of the circle?—I have not been talking about agricultural graduates, but ordinary school boys who have passed the middle vernacular schools; educating these is not the only way to make agriculture pay.

36,787. Even for them is it attractive enough as the village conditions are at present?—I think if they can get jobs as *patwaris* or vernacular clerks they prefer them to the life on the land.

36,788. Mr. Pim: One of the methods suggested of meeting the difficulty of taking the boys away was the establishment of part-time schools. Have the experiments made in that direction been a success?—No; they have not been a success.

36,789. What are the crucial objections? Why have they failed?—Because the people who had sent their children to the school want them to go

full time. I do not think that they want half-time schools. If they send their children at all, they want them to get value for the money.

36,790. Had the prejudice of the teachers anything to do with it?—I do not think that the teachers were in favour of it. They probably knew that if the pupils left the school at half time and went home they would only loiter on the road; they knew that the boys were not required to work on the land but were only wasting their time.

(The witness withdrew.)

The Commission then adjourned till 11.45 a.m. on Saturday, the 5th February, 1927.

Mr. A. B. Mackenzie.

Saturday, February 5th, 1927.

LUCKNOW.

PRESENT:

THE MARQUESS OF LINLITHGOW, D.L. (*Chairman*).

Sir HENRY STAVELEY LAWRENCE,
K.C.S.I., I.C.S.

Sir THOMAS MIDDLETON, K.B.E.,
C.B.

Rai Bahadur Sir GANGA RAM, Kt.,
C.I.E., M.V.O.

Sir JAMES MACKENNA, Kt., C.I.E.,
I.C.S.

Mr. H. CALVERT, C.I.E., I.C.S.

Raja Sri KRISHNA CHANDRA GAJA-
PATI NARAYANA DEO of Parla-
kimeri.

Professor N. GANGULEE.

Mr. B. S. KAMAT.

Mr. A. W. PIM, C.S.I., C.I.E., I.C.S. } (*Co-opted Members*).

Raja Sir RAMPAL SINGH

Mr. J. A. MADAN, I.C.S. } (*Joint Secretaries*).

Mr. F. W. H. SMITH

Mr. F. F. R. CHANNER, Chief Conservator of Forests,
United Provinces.

Replies to the Questionnaire.

QUESTION 19.—FORESTS (*a*).—Yes, it is believed that forest lands are being put to their fullest use for agricultural purposes. Wherever grazing has been reduced or excluded for the sake of forest preservation full justification is demanded not only by the Conservators concerned, but also by the Collector and Commissioner of the district. As all rules affecting grazing are scrutinised at every ten-yearly revision of the working plan, these matters receive ample attention. Our knowledge of the silviculture of trees and the ecology of grasses is insufficient for us to dogmatise on the effects of varying intensities of grazing either on the forest or on the grasses themselves, but, where there is a demand for grazing, all reasonable risks are taken.

(b) (i) *Plains and Bhabar forests*.—(1) *From existing reserves*.—The supply of firewood in rural areas depends greatly on the cost of transport from the forest. The forests of Gorakhpur division are an almost solitary exception to the general position, namely, quantities of unsaleable fuel left to rot in the forests. Special means of transport, such as tramways, are seldom profitable where firewood alone is concerned, and the only remedy likely to be of much value is the reduction of the rates charged for carriage of fuel by rail, which appear excessive and seriously curtail export. These rates adversely affect the export of charcoal and bamboos as well as fuel, and the Commission are invited to examine the figures given in the Utilization Report of this Province for 1925-26, a copy of which will be sent as soon as it is received from the press.

The supply of fodder in rural areas is again a question depending considerably on freight charges and, as in the case of fuel, the margin of profit is too small to justify the introduction of expensive tramlines and the like. The freight charges for grass are such that it becomes unprofitable to rail it more than 50 miles, even though it be baled. It seems,

therefore, that little can be done to increase the supply from existing reserves.

Before, however, any extensive benefit could be obtained by reduction of transport costs it would have to be ascertained that the villagers concerned would be willing to pay the reduced price or any price. My experience is that cowdung owned by a villager will be burnt before he will pay anything at all for wood fuel. In fact, villagers who can get free fuel sell their cowdung to villagers who cannot get it.

(2) *From unreserved waste land.*—In districts such as Agra and Etawah we have large tracts of bare ravine land producing little grazing of value and no grass. By the protection and partial afforestation of such lands large quantities of grass are produced which must be a great asset to the local population. In fact, mere protection without afforestation is sufficient to rapidly improve the existing scrub and enable the soil to produce good crops of grass. It is therefore suggested that more attention be paid to ravine lands and that protection, apart from any scheme of afforestation, be extended on a much enlarged scale. Whether reservation under the Forest Act would in such cases be essential, is not certain. The areas would in any case be divided up into blocks, which would be opened and closed to grazing in rotation. The most satisfactory rotation would only be ascertainable as the result of experiment. Though the question of ravine lands has been especially mentioned, there is often, quite apart from the ravine country, considerable waste land where something might be done. Such plantations and fodder reserves should be the property of the villagers; in fact small communal forests. All labour should be supplied free by the villagers themselves and the work controlled by the civil authorities under the advice of the Forest Department. Such communal forests by providing small timber and fuel as well as fodder grass should allow manure, which is now largely used for fuel, to be used for fertilising the soil, provided of course they do not sell it to less fortunate villagers. The villagers might in many cases be induced to take an interest in the work by combining the formation of forests with the growing of field crops on the system known as *taungya*, a word borrowed from Burma. Forests which have been clear felled are being re-created successfully on this system in the Gorakhpur forest division at small net expense. Also where irrigation is practicable, the difficulty and expense of creating forests will be much decreased.

(ii) *Forests in the Kumaon hills.*—In the hills there are considerable tracts almost entirely devoid of tree growth. Lack of fuel and fodder is much felt in such places, and the few enclosed plantations so far made are frequently much valued by the neighbouring villagers. There is, in fact, some desire for extension of these plantations. It is therefore suggested that in bare tracts there should be further co-operation with the villagers in the establishment of plantations to increase the supply of firewood and fodder.

(c) Deterioration of forests has led to soil erosion in instances too numerous to record. There are, however, degrees in soil erosion and the more numerous cases of slight erosion of the surface soil may be capable of rectification within a few decades if the cause of deterioration is removed. Under this class may be included thousands of acres of forest in the Kumaon and Garhwal Himalaya, where heavy lopping (principally of oaks) and excessive fellings are still causing deterioration of the forest and soil erosion. These remarks apply mainly to class I reserved forests, over which the Forest Department have now no control.

The more serious cases of soil erosion, in which the whole surface of the soil is laid bare, and vegetation is reduced to scattered tufts of grass or shrubs, are practically confined to areas of waste land outside the limits of reserves. The most notable cases of such erosion have taken

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place along the banks of the Jumna and other large rivers and have resulted in the formation of thousands of acres of bare ravine land.

The obvious remedy in the case of soil erosion resulting from the deterioration of forests in the Kumaon hills is control by the Forest Department of lopping and felling somewhat on the lines laid down at the original forest settlement of these tracts between 1911 and 1920. The present unsatisfactory state of affairs is due to the serious unrest which the 1911 settlement gave rise to, leading to the recommendations of the Kumaon Grievances Committee.

These have been in operation for the last five years and in accordance with these recommendations control by the Forest Department over vast tracts of forest was entirely removed. It does not appear to be a practical proposition to revert to control, except in so far as it receives the support of public opinion.

In the case of ravine erosion along the banks of the large rivers, the only remedy is the protection of the surface soil by the prevention or adequate control of grazing. To this end the lands may be reserved under the Forest Act with afforestation as its ultimate object. This has been done already for a fairly large area in the Jumna basin. But, as hinted in the reply to question 19 (b), afforestation is not essential if the only object is the prevention of erosion. Adequate protection afforded by the prevention or control of grazing is sufficient for this purpose.

Soil erosion also occurs in parts of the reserved forests where the ground is not flat or nearly flat, and grazing is excessive locally.

(d) It is believed that the supply of moisture in the soil and the rainfall cannot be increased by afforestation or increased protection of forests so as materially to benefit agriculture. It is not to be inferred from this that afforestation does not result in increasing the moisture in the soil within the forest, but merely that this cannot be expected to affect the surrounding cultivation to any measurable extent. That afforestation increases the moisture content of the soil has been amply proved in the ravine reclamation work now being carried on in the Afforestation Division, where it has been stated that the moisture penetrates to a depth of 12 feet in areas where it previously penetrated as many inches.

On the other hand, the supply of canal water can almost certainly be improved by increased protection of hilly forests notably those of the Kumaon and Garhwal hill tracts. In order that agriculture may derive its maximum benefit from canal water, the supply of water must be constant and, more specially, should not fail during the dry months of the year. The rivers from which the canals in this Province derive their water all rise within the Himalayas and the supply of canal water must depend very largely on the deterioration or otherwise of the forest. Destruction of the forest spells erosion, leaving the soil bare so that a rapid run-off of surface water takes place and there is little conservation of moisture on which the springs can rely during the dry months of the year.

The increased protection of the hill forests recommended above would also to some extent prevent the erosion of agricultural land since the tendency would be to prevent floods due to a too rapid run-off during periods of heavy rain.

The afforestation of the ravine lands near large rivers already mentioned above would have a very marked effect in preventing destruction of agricultural lands which are being visibly eaten into by ravines. Afforestation in the Etawah district has prevented the extension of some ravines but, where the land is cultivated right up to the ravine, the villagers will not agree to afforestation round the head of the ravine and erosion continues.

(e) As already mentioned under (b) and (c), there is an opening for schemes of afforestation in the neighbourhood of villages especially where

there are border ravine lands similar to those of the Etawah district. We are at present afforesting 2,000 acres per annum of such land with results which cannot fail to be of the greatest value to the local agriculturist in that:—

- (i) Further erosion of agricultural land is prevented.
- (ii) A local supply of fuel is created.
- (iii) The grazing is much improved in quality if not in quantity.
- (iv) Large quantities of grass are grown where previously none existed.

It would probably be unwise immediately to increase largely the area annually treated owing to the number of silvicultural and economic problems which still remain unsolved and which can only be overcome by patient scientific investigation extending over a number of years. Such problems include the selection of species best adapted to varying conditions of soil and climate (frost is a local factor of importance), the cheapest and most profitable methods of preparing the soil and sowing the seed, the value of the produce when grown, the yields that may be expected and the extent of local consumption. Errors of judgment in any of the above matters may prove very costly and will be the more so larger the area involved.

In Kumaon, also the need for afforestation has been noted under 19 (b). The possibility of combining this with some form of communal forest management is being studied. At present an officer has been deputed on special duty to study the communal forests in Madras where they are reported to be an extensive and generally successful feature of forest management. Since the inhabitants of Kumaon resent any interference with their destructive habits, progress will have to be slow. As a rule the hill man only realises his need of forests when he has entirely destroyed them.

- (f) (i) *Plains and Bhabar forests.*
- (1) The more valuable *sal* forests.

Generally speaking, these forests are not suffering to any appreciable extent from excessive grazing. There are of course exceptions, but as soon as damage becomes serious, the obvious remedy of reducing the incidence of grazing is often possible.

An exception occurs in the *sal* forests open to rights near villages along the boundaries of the Ramnagar, Kalagarh and Lansdowne divisions in the Naini Tal and Garhwal districts. These forests are rapidly deteriorating, as for instance near the Kotah Dun and Patkot. In such areas, it is not only impossible to obtain natural regeneration, owing to the trampling of cattle but the villagers obtain no real benefit because the trampling destroys the grass and there is no fodder to speak of. Closures however merely create fierce local resentment which, even if withstood, reacts most unfavourably on the comparatively friendly relations between the people and the Department which are essential if forest protection and utilization are to be successfully conducted. In such cases, the only remedy seems to be the education of the people to the fact that a few well-fed cattle would do far more good to the cultivators in every way than large herds consisting of animals of the poor type now existing. The desideratum is controlled breeding and grazing fees on a scale which would make the cost of an animal's feed bear a proper proportion to the profits it brings an owner. For example assume that the market value of a herd of 100 head is Rs. 10,000, the owner's net profit at 5 per cent. should be Rs. 500, say his revenue is Rs.1,000 and his other expenses are Rs.100 then he can afford Rs.400 for forest grazing—Rs.4 per head. Such figures could only be applied to purely commercial grazing but nevertheless all grazing in forests should be on a business basis. What is free or of little value is never appreciated and it is largely the low cost of forest grazing which leads to the existence of these large herds of inferior cattle which in their

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turn lead to ever increasing demands for more free (or cheap) and inferior grazing.

(2) *Less valuable miscellaneous forests.*

These forests differ from those maintained solely as grazing grounds in that the timber and fuel is of equal or greater value than the grass and grazing. They occupy an intermediate position between the better protected *sal* forests and the open grazing grounds. In some of these lands deterioration is certainly taking place; partly on account of the grazing which is often heavy, and partly on account of ceaseless lopping and felling either for fodder or for making temporary huts, etc. As a special example may be cited the outer fringe of hills west of Ramnagar in the Naini Tal district. The only remedy in such cases is some curtailment of the incidence of grazing on the lines proposed above.

(3) *Areas maintained mainly or solely as grazing grounds.*

Cases of serious damage due to excessive grazing are commonest in lands which are being maintained solely or mainly as grazing grounds for the benefit of graziers. The forest officer can usually succeed in persuading the revenue authorities as to the harmful results of excessive grazing in areas where valuable timber is being grown, but he finds it very much more difficult to prove the deterioration which is taking place in areas maintained as grazing grounds. Nevertheless such forests as Bhinga in the Bahraich Division and certain grazing grounds in the north of the Gorakhpur Division, where grazing is permitted during the whole year, have undoubtedly deteriorated very considerably and are still deteriorating. The remedy again in such cases is to reduce the grazing incidence and to give the grazing grounds periods of rest.

(ii) *Forests in the Kumaon hills.*

The effect of grazing combined with excessive lopping and felling in the hills has been already mentioned under question 19 (d). Of these harmful influences, grazing is probably the less important but is nevertheless aiding serious erosion in many forests.

Oral Evidence.

36,791. *The Chairman:* Mr. Channer, you are Chief Conservator of Forests in the United Provinces?—Yes.

36,792. We have your note of the evidence that you wish to put before the Royal Commission. Would you like to make any statement in amplification of that at this stage?—No; I do not think that I want to say anything new now.

36,793. Are you satisfied with the degree of touch between your own department and the Agricultural Department?—We have very little touch with the Agricultural Department proper; we do not come into contact with them. The great bulk of the United Provinces forests with which I am concerned affect the Province only a very little. They are all on one long belt where the population is scanty and the agriculture is of rather a precarious nature and we do not come up against the conditions of the Province as a whole.

36,794. I suppose that statement is really a relative one; in fact, a very considerable rural population cultivate on the edges of your forest land, do they not?—Yes, there is a considerable population, but it is very sparse compared to the really thickly populated parts of the Province, except in Gorakhpur.

36,795. Have you shifting cultivation in your forests?—We do not allow any shifting cultivation inside the forests. A good deal goes on outside on waste lands. There is an enormous area of waste land round about the forests which is used for shifting cultivation.

36,796. Have you distinct tribes whose tradition it is to live by *jhuming*?—I should not call that a real aboriginal custom, except that there is a small band of people called *Tharus* who live round about the Sarda river.

36,797. I see that, on the first page of your note of evidence, you express the view that the existing state of knowledge as to the damage that grazing is likely to do to both trees and grasses is really insufficient to enable you to dogmatise at this stage?—It is insufficient to dogmatise in detail on the varying intensities of grazing. We cannot say exactly that one acre is required for one head and so on.

36,798. I suppose the damage done to growing forest takes a long time to show itself; saplings are eaten off and come away from the root, and young trees are bent by cattle treading on them, and it is only in the course of years that it is possible to measure the damage done? Is that the position?—When we speak of damage by grazing we mean more the prevention of natural regeneration than damage to the growing trees which are quite above the reach of the cattle, and especially the trampling of the cattle makes the ground so hard that no seedlings will come up.

36,799. On page 329, in answer to our Question 19 (b), you say that the only step that is likely to place fuel from certain forests within the economic capacity of the population is chiefly reduction in railway freight rates?—I think that it would be a help, but I do not think that it would really go very far. The carriage of fuel by rail must always remain a very large factor. You cannot carry it for nothing; it is very bulky, and although one or two railways might bring down their charges a little, I do not think there is much in that.

36,800. You are not prepared to say that the existing rates on the whole are excessive?—No.

36,801. Are you making charcoal?—Yes, we are making renewed efforts to put charcoal on to distant markets, but we do not meet with much response from the markets and we find it very hard to sell it.

36,802. Is that because cowdung is preferred?—I do not think it has anything to do with cowdung. There is no hope of selling charcoal in villages; our fuel markets are entirely in the towns.

36,803. What is charcoal used for? Is it used for cooking purposes?—Yes, for domestic purposes, and in small factories where they keep small furnaces.

36,804. Have you any fodder reserved in your forests against the possibility of a fodder famine?—We have, in the western part of the Province, a small scheme for making fodder in stacks. The idea is to have a small reserve to begin on in case we should be asked to produce fodder on a large scale in a famine; it is also largely educational, so that our staff may be kept up-to-date. That is really the main benefit.

36,805. Do you keep the fodder preserved for two or three seasons?—Yes; the idea was to experiment with a view to seeing how long it could be kept. We have now kept some for five years and we find that it can still be eaten, although the fodder is very poor.

36,806. Is that in a thatched stack?—Yes, with careful re-thatching and repairing every year.

36,807. Can you give us any indication as to the amount of fodder stored at the moment?—I am afraid not.

36,808. Is it a considerable amount?—It is very small and of no importance really.

36,809. I have it in mind that a considerable experiment was attempted in this Province in the direction of growing fodder grass on certain waste

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lands under the direction of your department; is that so?—I have no knowledge of it, I am afraid.

36,810. Your efforts have been directed with very considerable success towards the prevention of erosion of ravine heads and other land liable to be washed away, by means of encouraging the growth of trees on the land in question?—Yes; but we have trusted to nature to grow the grass.

36,811. Simply kept away the cattle?—We have closed the areas for the purposes of afforestation and the grass comes in itself.

36,812. Have you planted young trees?—We have both sown and planted them.

36,813. Do you fence?—Yes, we fence the areas immediately under regeneration till they are about four or five years old.

36,814. What type of fence do you use?—The three strand barbed wire, but we suffer very much from wild animals, especially porcupines, and recently we came to the conclusion that it would be well to have a better fence against these animals.

36,815. They bark the trees, do they not?—They eat the trees completely.

36,816. What about deer?—There is not much difficulty about deer.

36,817. And pig?—Yes, they do a good deal of damage.

36,818. Is there great scope for work of this sort in these Provinces?—Yes, there is a tremendous area to be done and it would afford a great deal of benefit. The area we tackle is minute compared to the total area of this kind of ravine land which is going on increasing at an almost visible pace.

36,819. It is a question of protecting the existing agricultural land? Is that the point?—Yes, we find considerable difficulties in protecting existing cultural land because when the ravines begin to come into the fields they cultivate right up to the edge of the ravine and they will not give us even a yard to plant round the edges of the ravines, and in such circumstances we can do nothing.

36,820. On what basis have you selected the areas where your work has been carried on?—We began with what is called the "Fisher" forest in Etawah where a certain Collector had done something of this sort himself. He created this forest with the idea of growing *babul* trees to supply Cawnpore factories; in fact he grew a very successful forest there which one of the Cawnpore firms took over and felled. We took over this forest from them and proceeded to extend the work.

36,821. Can you give the Commission any idea of the area protected by what you have done already?—We have actually afforested just over 14,000 acres of ravine land, and we are doing about 2,000 acres a year at present.

36,822. That is the actual area planted?—It is actual plantation.

36,823. Of course, the area protected by that is, I suppose, a good deal larger?—The area saved from getting any worse is larger.

36,824. In the processes of nature, the result of not having trees and grasses to prevent erosion is to carry these *mullahs* back into the country indefinitely?—Yes.

36,825. Do you suggest that there should be any attempt to compel villagers to leave the necessary minimum amount of land for planting to protect their lands against further erosion?—My experience is that compelling villagers to do anything at all is not promising.

36,826. If other forest land were available reasonably near the village, do you think an exchange might be effected, so that the cultivator would

get conveniently situated land, equal to the total area required by you for protective afforestation?—In the districts where we have been doing this kind of work, that has not been possible, because all the land that is at all suitable for cultivation is cultivated. Only uninviting tracts, where we could grow forests, are left uncultivated.

36,827. I understand you are considering the possibility of making experiments in *panchayat* control of forests?—Yes; a Deputy Collector of these Provinces has been sent down to Madras to study the methods there of forming communal forests. That was with a view to settling the difficulties in the Kumaon forest circle rather than in the plains.

36,828. Do you feel that the interests of the cultivators whose land is near the forests are receiving a fair share of consideration in respect of the wild animals having their habitat in the Government forests?—We do not do anything particular to get rid of wild animals.

36,829. Do you do anything to protect them?—We do not do anything to protect outlying fields.

36,830. What is the situation in the Government forests near cultivated land? Is unlimited shooting by those persons who have licences permitted?—No; they are not allowed to go into the forests and shoot under the shooting rules. Those who have guns are allowed to shoot anything that comes out on their fields.

36,831. Are persons who are allowed, under the shooting rules, to go into the forests, controlled in any way as to the size of the animals which they are allowed to shoot or the particular species?—The whole idea of the shooting rules is protection of game; that is what they are for. We ourselves suffer a great deal from the amount of deer in the forests. As regards keeping down the numbers, the shooting rules do not meet the case at all.

36,832. Do you think the shooting rules are justifiable?—From a commercial point of view, certainly not; it is entirely sentimental.

36,833. How long is it since these rules have been reviewed?—It is about twenty years now since the present rules came into force.

36,834. I see you have a booklet giving illustrations of ravine reafforestation?—There are pictures taken after reafforestation has been effected.

36,835. Can you give us any idea of the total expense of protecting ravine land?—Our cost in establishing a forest is Rs.80 an acre.

36,836. That is for forest area established?—Yes, actual trees.

36,837. Over how many years is that spent?—That has been for about the last twelve years.

36,838. That includes fencing?—That includes everything.

36,839. How soon would these areas be available for grazing?—Three to four years.

36,840. In three to four years from the time you start planting, it would be safe to allow grazing?—Yes.

36,841. What is the size of the trees in three or four years?—Anything from seven feet and over. Of course, they do not do as well everywhere, but they are mainly out of the reach of cattle.

36,842. What is the custom here? To leave them for two years in the nursery?—In these areas we have more direct sowing than anything else, but where we have nurseries it is one year only.

36,843. Does it work out very much more expensive than the nursery system?—Direct sowing is cheaper, but if we have to do a great deal of replacement it works out more expensive.

36,844. Have you attempted at all to correlate the amount of expenditure involved in reclaiming these areas with the agricultural value which you protect?—No.

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36,845. From the angle of public revenue it is an important consideration, if you are considering the extension of the scheme on a large scale?—Yes. We have not worked out in figures all the agricultural revenue saved.

36,846. *The Raja of Parlakimedi*: Is the reservation of forests increasing?—It is not increasing, except that occasionally we take up new blocks for afforestation. They are mainly private owned, and we take up the new blocks at the request of the zamindars.

36,847. You take them up?—We take them up at their request; we pay them eight annas an acre, and we do the work.

36,848. Has there been any record to show that such protection results in an increase of rainfall?—No. The evidence about an increase of rainfall on account of forests is very uncertain, and I think it must be regarded as an unproved thing.

36,849. In some places, when there are reserves, it has increased the rainfall to some extent?—The expert evidence is entirely inconclusive. There have been most careful experiments in Europe and America, and it is not considered that they provide any evidence that it really increases the actual rainfall. It increases the amount of rainfall that goes into the ground enormously, and that is the chief benefit.

36,850. It prevents evaporation?—The rainfall, instead of rushing away, is retained in the soil.

36,851. What are your commercial trees and plants?—The *sal* tree is the main source of our revenue, and, to a certain extent, *deodar* in the hills. The *sal* is the tree of the United Provinces.

36,852. What is it chiefly used for?—For railway sleepers and constructional work of all kinds, rafters, beams, &c.

36,853. Is any rosin being taken out of it?—Not out of *sal*; rosin comes out of pine.

36,854. There is a variety similar to *sal* from which they extract rosin?—I really do not know. The *sal* does give a gum, but it has no commercial value.

36,855. Have you got any tanning bark producing trees?—The *sal* bark itself is fair tanning material. Cawnpore has made several efforts to use it, but they have always dropped it. They did not find that the amount of tanning material in the bark was worth the cost of the carriage; I think that is the trouble.

36,856. To meet the demand of the fuel difficulty in villages, in your reserves do you allow people to go into the forests to pick dead wood?—Yes. All surrounding villages have the right of picking up dead wood.

36,857. Have they to pay any fees at all?—It differs in different localities. In the majority of cases, the people living on the edge of the forests have free rights to fuel. In some divisions there are no such rights; they merely pay a very small fee for a permit.

36,858. Is not the quantity restricted?—No; we never attempt to measure it.

36,859. You say that you wish to have the co-operation of the villagers for raising plantations?—Yes.

36,860. To what extent do you wish to have that co-operation?—My idea is that if the villagers were themselves anxious to have village forests for fuel supply, if the technical department controlled the work, they should give the labour voluntarily, either free or at very small rates. In that way, the expense would be kept down, the labour difficulty would be overcome, and instead of having the whole thing objected to all the time, they would be enthusiastic supporters of it, and they would help to protect it.

36,861. Have you had any non-official body in this Province helping in protect the forests?—No.

36,862. Such as *panchayats*?—No. We have not tried any village forests of that type yet but, as I was saying just now, we are enquiring about the system in Madras.

36,863. In the Central Provinces, they have what are called forest villages to provide labour for some of their forest operations. Do you have that sort of system here?—We have two or three such villages, and we have created them where labour is very scanty.

36,864. What is the remuneration you pay to a villager of that type?—They are allowed to cultivate the land inside the reserved forest, and their remuneration is what they make out of growing crops.

36,865. What sort of work are they expected to do?—Repairing roads inside the forest, cutting fire lines. They have to do all the various forest work which we have to do.

36,866. Clearing the fire lines?—Yes.

36,867. When they cut those lines, are they given any portion of the wood that they have to clear from the land?—All these forest villages have everything they want. We treat them very liberally.

36,868. Is the work limited? Are there any prescribed hours of work, and so on?—Yes, the number of hours of labour is laid down in our agreements: so many men in the year have to be provided and so many days' work.

36,869. *Sir James MacKenna*: I am very much interested in your suggestion on page 330 of your note that the system of *taungya*, which in Burma we considered most objectionable, might profitably be utilised in the afforestation of your ravine lands. By being permitted to indulge in this shifting cultivation I suppose people would develop an interest in the tract?—We use it as a method of replacing the forest without cost; we clear-fell a part of the forest, put *taungya* cultivators on that area, and when it has grown again we put them on the next area.

36,870. They are kept well under control?—Yes; it is very limited in scope. It can only be done where there is an excess of cultivating population and a scarcity of land.

36,871. *Mr. Culvert*: Who takes out the roots and stumps?—They do.

Sir James MacKenna: It is a very interesting suggestion from the point of view of Burma.

36,872. *Professor Gangulee*: Have you facilities for carrying on research into forest products in the Province?—Yes, we have a research branch, and we depend a good deal on the central research branch at Dehra Dun.

36,873. You are closely connected with the central research branch?—Yes we keep in touch with them.

36,874. Where is your forest research station?—We have no research station; our officers go about all through the forest in the cold weather and the hot weather, and in the rains they go up to Naini Tal; we have offices there; we have no laboratories or anything of that sort.

36,875. Your investigations are then chiefly limited to observations of forest areas?—Yes, measuring the rate of growth of trees, observing the behaviour of forests when treated in different ways, and so on; experimental areas of all kinds are observed.

36,876. As you have no provincial laboratory, you cannot carry on any researches on, for instance, soil problems associated with forestry?—No, we have no means of analysing soils.

36,877. Nor have you facilities for the investigation of problems arising out of different forest areas?—That is done more by observation than by any actual tests of soil.

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36,878. When you have a problem of that sort, you approach the central research station at Dehra Dun?—Yes.

36,879. For instance, problems with regard to forest insects?—Yes, we go to Dehra Dun entirely for entomology; we have no local entomologist.

36,880. You collect data and submit them to this central research institution for investigation?—Yes, they deal with our insect investigations.

36,881. To what extent in this Province may *usar*, alkaline land, be afforested?—We are experimenting with regard to *usar* land now; we have been doing so for the last two or three years; I cannot say that we have had any direct success so far, but we have received a certain amount of encouragement.

36,882. There is a great deal of scope in that direction?—Yes.

36,883. It would be of great advantage if you could in some way counteract the effects of the alkaline deposits?—Yes.

36,884. Where are your subordinate officials trained?—At Dehra Dun down to the rank of ranger; below that we train them locally.

36,885. Have you a forest school?—We have a peripatetic training class which wanders through the jungles.

36,886. Your forest guards are trained in that way?—Yes; we call them foresters; they are the men over the forest guards, between them and the rangers.

36,887. The other officials are trained at Dehra Dun?—Yes.

36,888. Up to the Deputy Conservator of Forests?—No; the Assistant Conservators of Forests used all to be recruited in England, but now they are training Indians for the Indian Forest Service at Dehra Dun.

36,889. *Mr. Culvert*: Are you getting much income from grass from these Etawah ravines?—Yes, a certain amount; I am afraid I cannot give the figure straight away, but we are able to sell all the grass we have got, and we consider that we could sell a great deal more; we have recently set up a hydraulic press for baling grass and exporting it to the larger centres.

36,890. Was this figure of Rs.80 an acre, which you gave the Chairman, representative of the gross expenditure, or was it net after deducting the income from grass?—No, that is net after deducting income.

36,891. Do you think you will be able to recover that from the sale of timber when it is ready for cutting?—Yes, we hope so. Of course, we are rather doubtful as to what these forests will be worth eventually; we have really nothing to go on.

36,892. It is not yet certain to what extent they will be an economic proposition?—No, I rather doubt it myself.

36,893. I have read these two reports on the work; has the subsequent course of events in any way led you to alter the opinions therein expressed?—We have had a lot of trouble lately with trees dying; we have had rather a set back; some of these larger forests of *babul* have suffered terribly from frosts lately, and also from the existence of a pan of *kankar* underneath.

36,894. In the total forest area under your charge, could you tell us the area that is excluded both from cutting and from grazing?—It is practically nil.

36,895. Practically all the grass in your forests is available for cattle?—Yes.

36,896. Do you anticipate valuable results from this Dehra Dun research work on utilisation?—I think they will be of more value to the commercial world than to us.

36,897. Is there any hope that they may lead to the establishment of industries subsidiary to forestry?—Yes. For instance, they have established the treated sleeper industry, and they have great hopes of establishing a paper industry and a match industry.

36,898. There is wood here which is suitable for matches?—I should not call it suitable; there is wood that will do.

36,899. It will serve the purpose?—Yes.

36,900. Have you any irrigated plantations in this Province for the supply of wood to towns?—No.

36,901. Are you attempting here to protect agricultural land which is subject to damage from annual floods?—We have made endeavours to check the damage done by the floods coming down from the Siwalik Hills by keeping the streams in their courses, but we have not met with much success; we can only erect small *bunds*, and they generally get washed away.

36,902. Is it true that you are exploiting your forests without regard to the agricultural interests?—I should have said not; I do not quite follow the question.

36,903. Do you think your Forest Department is apathetic concerning the interests of the agriculturists?—No, not at all.

36,904. Is it true that your department would not shrink from levying fees and enhancing them, however harmful it might be to agricultural interests?—No, it is not true.

36,905. Is it true that, owing to the number of wild animals in your forests, the number of men and women killed is sometimes tremendous?—No.

36,906. In your general forestry work, do you not do your best to show the utmost consideration to the legitimate interests of people in the neighbourhood?—Yes, we do our best always.

36,907. *Mr. Kamat*: On page 332 in your note you lay down a policy as to fixing grazing fees, and you say: "For example, assume that the market value of a herd of 100 head is Rs.10,000, the owner's net profit at 5 per cent. should be Rs.500; say his revenue is Rs.1,000 and his other expenses are Rs.100, then he can afford Rs.400 for forest grazing: Rs.4 per head." It seems to me that in this calculation his percentage of profit or his revenue is based on hypothetical figures?—Entirely.

36,908. If that is the case, would it be quite fair to fix a fee on purely hypothetical data?—I never intended that the fees should be fixed on such data; I merely put that in by way of explaining what I meant when I said that the grazing fee should be fixed on a commercial basis.

36,909. Yes, but the point is, how are you to get at the commercial basis? It should not be arrived at on hypothetical data?—No, I quite agree; that was merely explanatory of my point, not that I ever intended to calculate grazing fees in that particular way.

36,910. This particular example may be explanatory, but the principle on which you propose to arrive at your level of grazing fees is not correct, because all the while you are assuming what his profit is going to be and what his revenue is going to be, and on that you fix the level of your fees?—But no grazing fees have ever been fixed by such a method; they are all far below that limit. If that principle were followed, we should base it on collected data, not on hypothesis.

36,911. But is it a workable principle to assume that the profit is so much? Surely you must fix your fees on some other basis?—We might not be able to work it out in that way. We have just the same difficulty as to the price of timber, and we are getting over that difficulty generally by putting it up to auction.

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36,912. There you get the data because there is competitive bidding?—Yes; we might do the same thing with regard to commercial grazing.

36,913. That means changing the principle?—Yes.

36,914. You would not then be adopting this arbitrary principle?—I never had any intention of fixing grazing fees on assumed figures that I really knew nothing about; these figures were really only by way of explanation of my idea.

36,915. *Mr. Pim*: Is the opposition to your operations diminishing?—Yes, distinctly diminishing.

36,916. Would you say that the advantages are becoming recognised by the villagers in the immediate neighbourhood?—Yes, I should, very much so; the Divisional Officer told me the other day that he had hopes of persuading some villages to enclose areas on their own account for the grass, and work them in rotation without any afforestation at all.

36,917. You suggest communal forests; do you think there are hopes of these being practicable in this area?—Yes, I should think more so there than anywhere else.

36,918. More so there than in the hills?—Yes.

36,919. *Sir Henry Lawrence*: You mention that the shooting rules are based on sentiment. Has the sentiment of preservation of life become sufficiently strong to become an instinct?—Both the English and the Indians are very keen on sport. I think that a very large body of public opinion would decry any proposal that all sport should become extinct in the interests of either agriculture or forests.

36,920. Do you consider that the various species of game would become extinct if free shooting were allowed in the forests?—They would not become extinct, but they would become very much scarcer.

36,921. The total area of ravine land is 100,000 acres?—I am afraid I have not got the figures here.

36,922. It is given in this report; out of that you are now dealing with 14,000 acres?—Yes.

36,923. *Sir Ganga Ram*: Besides *sal*, what timber have you got here?—A certain amount of *deodar* in Chakrata, near Dehra Dun.

36,924. Have you ever thought of starting a resin industry from *deodar*?—We have a large resin industry with a big factory near Bareilly.

36,925. Do you supply sleepers to the railways in your Province?—We supply all the metre gauge lines.

36,926. Is not *sal* suited for broad gauge sleepers?—We have not got many forests which will supply timber for broad gauge sleepers.

36,927. What other industries are you attempting?—Matchmaking, paper-making.

36,928. Have you done any research in bamboo?—No; we have very little bamboo in the United Provinces.

36,929. From what do you propose to make paper pulp?—I had mentioned the industries which the Central Research Institute at Dehra Dun is taking up.

36,930. From the raw material of your Province?—It is not really from this Province; but they have made paper from the coarse grass.

36,931. Has no research been done on the raw produce of your forests for the purpose of paper pulp?—Yes, our grass has been tried.

36,932. Not bamboo?—No.

36,933. Bamboo was tried in Burma?—Yes.

36,934. Have you not got much bamboo in the Bareilly district?—No.

36,935. Have you any big falls in the upper ranges of rivers from which electricity can be generated?—Yes, I believe so; there was a hydro-electric survey.

36,936. Are there big falls from which a large amount of electricity can be generated just as we are going to do in the Punjab?—I do not know much about hydro-electric matters.

36,937. Are there any perennial falls here?—There must be some.

36,938. Do you freely supply seedlings to the public, to the zamindars and others, if they want to increase their plantations?—So far as we have been doing the entire work for them; we have not been supplying the seedlings.

36,939. Is there no demand from the people? For instance, do you grow walnuts at all?—We do not grow walnuts.

36,940. Do you allow people to grow potatoes as interculture on any of your freshly-planted land?—Large areas of forest were taken and potatoes were grown on them, but we have never voluntarily given up land for potato cultivation.

36,941. Is not interculture with potatoes possible in any of the forests?—Potato cultivation is destructive to all kinds of cultivation afterwards.

36,942. I mean inter-cultivation?—We have not tried it.

36,943. Have you any Crown lands which you could give for agricultural purposes on lease to people who pass out from the Agricultural College?—I should not like to say that none of the lands we hold are uncultivable; some are cultivable, but our policy is to retain land for forests. We have a very small area at present in the Province and the policy of the Government is not to diminish it.

36,944. *Sir Thomas Middleton*: You said just now that potato cultivation was very destructive in forest areas; is that because of the soil erosion which takes place?—Yes; many of the hill sides in Kumaon become eroded entirely owing to potato cultivation.

36,945. Would it be possible to cultivate potatoes safely if the lands were carefully terraced?—Yes; but it would not pay, I understand.

36,946. Is there no terracing in the district?—There is for certain crops, but not for potatoes because the land is fit for potatoes for a year or two only and it would not pay them to terrace.

36,947. Are manures used in potato cultivation?—No.

36,948. Cultivators depend, I suppose, on the ash which they get when they burn down the forest?—Forest land produces excellent results for a year or two and then it is left fallow.

36,949. Because there is nothing more to burn?—Not because of the burning; but it seems to be incapable of producing anything further.

36,950. The excellence of the crop in the first instance is due to the burning of the forest brushwood?—It is due to the accumulated rot of forest produce for centuries; we call it humus.

36,951. You mentioned Rs.80 per acre as being the average cost of afforestation. How long is your ordinary rotation under such circumstances?—We expect the *babul* rotation, the principal tree we have grown, to be about forty years.

36,952. Do you reckon compound interest on your original cost?—No.

36,953. The question of interest does not trouble you?—That includes simple interest at 4 per cent., not compound interest.

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36,954. You refer to areas in Garhwal and Naini Tal districts where it is not only impossible to obtain satisfactory natural regeneration and where the villagers get no real benefit from the forests because of the excessive grazing?—Yes; it is not only in Kumaon but everywhere.

36,955. The reference was to Naini Tal and Garhwal districts on page 8 of your note. You go on to say that closure creates fierce local resentment?—Yes.

36,956. You point out that the only way of meeting the difficulty is by educating the villager to the damage that he is doing himself?—Yes.

36,957. Has any attempt ever been made to provide that education either by the Forest Department or by the Agricultural Department?—A great deal has been done by individual Forest Officers constantly talking to villagers; we have had no organised campaign of village lectures.

36,958. What is the area affected in these districts?—About 4,000 square miles.

36,959. Would it be possible for the Forest Department to enclose an area of 1,000 or 2,000 acres and show what could be done by grazing a suitable number of cattle on that area, so that your Forest Officers might talk in villages with some experience behind them?—We have done that; we have many enclosed plantations in Kumaon where they see the results of enclosures. They appreciate very much what we have done in those areas.

36,960. I am trying to ascertain the possibility of converting your estimate of the value to be got out of forest grazing from a hypothetical figure into a real one. If you could show that there were profits to be made on 1,000 or 2,000 acres when enclosed and properly grazed, there might be some chance of convincing the villager?—What they want is food for their cattle; there are too many cattle.

36,961. Would it not be possible by demonstration to show that by keeping a smaller number of cattle they would be better off than with over stocked grazing?—I think the only solution is to get them to control the breeding entirely.

36,962. I think that the policy of the Forest Department for very many years has been cheap grass and dear grazing?—I should think our grazing is very cheap.

36,963. We were told in another Province that, at a conference of Forestry Officers in 1913, it was laid down that the proper policy to pursue would be a policy of making the grass cheap but the grazing dear?—Yes; but I am afraid we have never followed it.

36,964. We asked whether in that particular Province the policy was followed and we were told no, and I suppose the same is the case in the United Provinces?—Yes; the opposition is too great.

36,965. So that although Forest Officers know what ought to be done they are making no progress towards the accomplishment of their object?—That is so.

36,966. *Raja Sir Rampal Singh*: On the first page of your note, you say the rules affecting grazing are scrutinised every ten years?—Yes.

36,967. By whom are they scrutinised, by departmental officers or by Government?—By both. When a working plan is revised the special officer in charge of the working plan goes into all the questions involved, including grazing, and makes proposals which he considers will meet the needs of the villagers and the necessities of the forest as far as possible. That is referred to the Collector of the district and the Commissioner for their approval, and the objections of villagers and landholders are heard and an inquiry made into the whole matter.

36,968. Are non-officials consulted also?—There is no regular system of committees for consulting them, or anything of that kind, but the local non-official people are always consulted.

36,969. Only when they make objections?—Yes.

36,970. They are not consulted when the rules are framed?—That would rest with the Collector. If the Collector thought there was someone whose advice was worth having, he would probably consult him.

36,971. These rules depend on the sanction of the Commissioner and the Collector?—Yes; no grazing rules ever go up to Government without the approval of the district authorities. It is not, however, the rules that are revised every ten years; it is the area in the forest open to grazing which is revised.

36,972. On the second page you observe that villagers who get their fuel free sell their cowdung to other villagers. Is that due to ignorance on their part?—Partly. At the place where I found them doing that, however, I was told they were cultivators who had no rights whatever in the land, and who therefore cared nothing for its improvement. They practise a good deal of shifting cultivation, so that the value of manuring the land does not appeal to them at all.

36,973. Do you grow *babul* trees on this ravine land you are planting?—We grow them a good deal, yes.

36,974. You told us you had nurseries from which trees were transplanted. Do you have nurseries for *babul* trees also?—With *babul* we use chiefly the method of direct sowing, but we have grown them in nurseries also. We experiment with nurseries for all trees, to see whether the system pays us better than direct sowing.

36,975. What other trees do you grow?—We grow a tree called *siris*, and *khair*, a kind of acacia from which a dye is made, and *shisham*.

36,976. What grazing fees do you charge, on the average, per head of cattle?—The general average is Rs. 1.8.0 for a buffalo and 12 annas for a cow, per year.

36,977. What is the *taungya* system you mention?—The villagers are allowed to cultivate a forest from which the trees have been cut down, and are under contract to sow lines of trees in between their lines of crops. The lines of trees are generally about ten feet apart. They plough up the land, put in the trees and sow their crops in between the lines of trees. They are allowed to go on cultivating the same land for about five years, until the trees are well up, and they have to replace any failures in the following years, protect the trees from wild animals, and do the weeding, which is an essential part of forest plantation work.

36,978. Has this system been tried by your Department?—Yes. It has been very successful in the Gorakhpur district. It depends on having a large population and a small area of land available.

36,979. You hope for a reduction in the number of cattle by more attention to breeding?—Yes.

36,980. Has any attempt been made in that direction?—My point, of course, is the control rather than the improvement of breeding. Improvement will, of course, result as a natural consequence, but if the herds, instead of being allowed to wander all over the country just as they choose, were controlled, these enormous herds, which are of no value to anyone, would not exist.

36,981. The effect of that would be to decrease the number of cattle?—Yes.

36,982. So that the price of cattle would rise?—So many of these cattle are undersized, underfed and of no value for any purpose whatever. The

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people do not even attempt to get any milk from many of them; some of them only give a pint a day, which is not worth the trouble of collecting.

36,983. Cannot their calves be sold?—There is a certain trade in calves, which are sent down country, and a good many of the animals are used for haulage, but the same amount of work could be accomplished with a smaller number of better animals. The life of an animal put into cart work is very short at the present time.

36,984. Has not the price of bullocks risen during the last ten years?—The price of everything has risen in the last ten years.

36,985. Yes, but our cultivators find great difficulty nowadays in getting bullocks at a price they can afford to pay. If the number were decreased I am afraid the price would become even higher than at present?—Possibly, but I think the advantage of having a smaller number of good cattle rather than a vast number of useless animals would make itself felt.

36,986. *Sir Ganga Ram*: Have you any light railways for transport purposes in forest areas?—Yes, two.

36,987. What gauge are they?—Two feet.

36,988. Do you use steam locomotives on that gauge?—Yes.

36,989. Is your hydraulic press for baling grass?—Yes.

36,990. What type is it?—Jessop's.

36,991. Then its capacity is not very great. Have you carried out any research into the growing of fruit trees or similar trees of commercial value?—No. We do not go outside our proper functions as a rule.

36,992. There is a tremendous demand in the commercial world for lemon oil, for instance?—Yes. There are, of course, many oils which have great commercial value.

36,993. Are there many roads in your areas devoid of bridges?—No. We have many unmetalled roads, and some of the District Board roads are very bad, particularly in forest areas, but they generally have bridges.

36,994. It is only the condition of the road that is bad?—Yes.

(The witness withdrew.)

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Replies to Questionnaire.

QUESTION 2.—AGRICULTURAL EDUCATION.—The efficiency of the agriculturist and his capacity to benefit by any special training in agriculture are determined by the general level of his culture and equipment. Considering the low percentage of literates in the Province and the very small number of boys who read up to the upper primary stage, it is, obviously, only a very small proportion of the agricultural population which can avail itself of any opportunity for a special training in agriculture. In order to remove this drawback, it is necessary to adopt a vigorous policy of mass education and to give it a distinct agricultural bias from the very outset. To take the questions serially:—

(i) The supply is insufficient.

(ii) There is an urgent need for extension of teaching facilities in many districts as there is only one vocational school at Bulandshahr in addition to the higher grade college at Cawnpore. In particular, there is urgent need for such an institution in Kumaon which, owing

to its peculiar physical characteristics calls for special treatment. Kumaon consists of the hilly districts with the submontane zone known as Terai and Bhabar and is clearly distinguishable from the rest of the Province. The nature of the country, the land tenure as well as the methods of cultivation, differ from those in vogue in the lower Province. No investigation has, I believe, been made so far into the agricultural problems of Kumaon, and it should not be deferred any further.

(iii) Yes, so far as possible.

(iv) Yes.

(v) Mostly, the hope of getting employment in Government service.

(vi) As most of the population is agricultural, the pupils are probably drawn from them, but people take to agricultural education not because of any special taste for it, but mainly with a view to securing some job. So long as the Bulandshahr school had not been started, the Cawnpore College was the only institution, and it was meant for the training of prospective *kanungos*, &c., and not for preparing agriculturists for their natural vocation.

(viii) Nature study should form part of the curriculum in primary schools, school plots should be attached to middle schools, and school farms to normal schools for giving instruction in agriculture as suggested hereafter.

(ix) The majority of students used to find employment in Government service.

(x) The department should investigate local conditions, should publish the results, clearly stating the type of agricultural activity which will suit different localities, the amount of money and material that will be needed to work it and the profits that it will yield. The department should help the middle-class qualified youth desirous of starting an agricultural career with part of the required capital, which should be recovered in easy instalments. If he wants to settle on Government land, Government should grant him sufficient land for the purpose on reasonable terms. It is necessary to give every possible encouragement to educated and trained young men to settle in rural areas, with a view to developing agriculture on improved lines. The Government will be relieved, to a certain extent, if farming and other agricultural pursuits are undertaken by private individuals on their own account, as in such localities the department need not run any farms at its own cost. It is also desirable to attract young men to this profession to check the growth of unemployment among the educated middle classes. In every case it should be easy for the Government to render pecuniary assistance to those young men who own land and are prepared to hypothecate it for the repayment of any capital advanced to them. There should be no difficulty in the way of Government advancing seed and implements and offering sound technical advice to such youths, if they start farms of their own. A large number of young men can be accommodated in the Government estates if the Government can protect them against the deleterious effects of a malarial climate.

(xi) No arrangements exist at present, but probably the department can arrange for some special short courses at big farms.

(xii) Higher agricultural education should be imparted at the Agricultural College, Cawnpore. The number of vocational schools of the Bulandshahr type should be increased and established in different parts of the Province, with due regard to the physical characteristics and the crops raised in different areas. Agricultural classes should be opened in normal schools, and agriculture should be one of the subjects prescribed for the vernacular middle examination. The Cawn-

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pore College should be affiliated to the University of Agra, and there should be a Faculty of Agriculture in that University. The agricultural schools should be under the Department of Agriculture and agricultural instruction in vernacular schools should form part of the curriculum of those schools under the Department of Public Instruction. The Local Government should finance all those institutions. There should be an Agricultural Development Board in which the non-official members of the Legislative Council, the Faculties of Agriculture of the different Universities in this Province, the Boards of High School and Intermediate Education, Industries and the Departments of Agriculture and Public Instruction should be represented. This Board will serve as a central co-ordinating body, and will look after the promotion of agriculture in the Province, and will advise the Minister of Agriculture in matters pertaining to agriculture. Schemes of agricultural development should be placed before this Board before they are recommended to the Finance Committee. The Board should form small committees for different physical and agricultural blocks of the Province, the present circles being adopted for the present with Kumaon as a separate circle. There should be at least one school in each circle.

QUESTION 3.—DEMONSTRATION AND PROPAGANDA.—Actual demonstration, at demonstration farms, of simple processes which are within the reach of an average cultivator impresses the cultivator more than anything else. Such farms should be established in the midst of a group of five or ten villages. The farms need not be very large, but will require careful management. The cultivator should be taken into the demonstrators' confidence and the details of the process adopted should be explained at every stage, at least to the holders of the neighbouring fields. The department may hire a field from a cultivator and the cultivator may himself be persuaded to run it on the lines demonstrated. A seed store should be attached to the farm, and, if possible, the department should also stock some implements which it should be prepared to give out on hire or to sell on the instalment system to cultivators for their own use.

Agricultural experts should be inspired by a genuine spirit of service, should have an understanding of, and sympathy with, the unsophisticated Indian cultivator who, even though illiterate, is thoroughly versed in his vocation and knows everything concerning his business. It is mostly on account of want of capital and information that he is still sticking to old methods. The method of protecting crops against insects and pests should be clearly explained to him while being practically demonstrated at the farm. If the experts make it a point to move freely in his midst, try to understand his difficulties, sympathise with him and thus win his confidence, and if means can be found to finance him, he can easily be persuaded to adopt modern methods. Vernacular and familiar terms for measures, &c., should be adopted in place of English terms.

A few instances of failure can be mentioned. Demonstrations at exhibitions and the working of the *Hadi* process of sugar manufacture were shown at various places, but they seldom won the confidence of the farmer. The tube-well system has cost a lot but cannot be said to have succeeded, mainly because of its prohibitive cost and the delay and defects involved in installing it.

QUESTION 4.—ADMINISTRATION.—(a) Every endeavour should be made to make the Provinces self-contained in the matter of expert knowledge and skill. Agriculture being a Transferred Subject, and being so largely dependent on local conditions, can best be handled by experts in the different Provinces under their respective Governments. The Government of India should assist the Provinces financially instead of increasing their

own scientific staff. The Agricultural Department of the Government of India can always advise Local Governments so as to avoid unnecessary overlapping and waste by occasional conferences of provincial Ministers and Directors.

(b) There should be adequate scientific staff for the necessary work of the Local Governments, and the Government of India may render financial assistance to them, which it should do at least so long as it does not completely remit the provincial contribution fixed under the Meston award.

(c) A thoroughly satisfactory state of affairs can only be secured by completely Indianising the services. A foreigner not only cannot reach the root causes of agricultural problems, a great many of which are, in India, interconnected with social usages, but, further, a great loss is occasioned through all his valuable experience being lost with the officer on his retirement. At present, an important part of the United Provinces, viz., Kumaon, which is full of potentialities, has been practically deprived of the State activities for agricultural development, whether research, investigation, demonstration, propaganda or teaching. As Kumaon consists mostly of hill districts, where transport difficulties form a serious obstacle to the import of food grains and provisions from outside, it is important that every effort should be made to make the division produce sufficient ordinary foodstuffs to meet its demands. Agricultural development cannot be achieved except through a network of easy communications. It is necessary to improve and extend the roads in Kumaon as, in their absence, neither agricultural implements nor good varieties of seed can be carried to villages, nor can agricultural produce be carried to the markets. Cattle breeding, dairying, fruit culture and preservation, should be developed. The possibilities of vine culture which has been admirably successful in the Swiss mountains may be investigated for the raisin industry, &c. Potato forms an important crop in Kumaon and, as the harvest alternates with the plains crop, it exports large quantities to the plains. The cultivation of the crop should be developed. The higher altitudes are specially congenial to sheep breeding for wool. There is a certain amount of sheep breeding practised at present in the Kumaon division, but the methods followed are not up to date, with the result that wool of an inferior type is produced. This wool is supplied to factories in the Province which manufacture woollen cloth. Improvement is urgently called for in the quality of this wool. There are numerous hill streams which can be utilised, if properly harnessed for cottage industry and irrigation and steps should be taken to utilise their hydraulic power.

QUESTION 5.—FINANCE.—Unless some methods are devised to render financial assistance to the cultivator, he cannot make use of any technical or improved methods of agriculture. At this stage, there is little hope of private bodies working on a co-operative basis for this purpose. At least, as an experimental measure, the system of supplying agricultural implements to cultivators on an instalment system should be tried. The present method of advancing seed on loan should be extended. *Taccavi* advances should be realised in easy instalments, and advances should not be made in cash through tahsil subordinates, but by means of cheques on some bank or treasury. The present system is very rigid and sometimes oppressive. The Government should have a primary charge on the crop for the seed advanced and on the implements and live-stock for the tools and plants supplied by them, and legislation should be resorted to to effect this if necessary.

QUESTION 6.—AGRICULTURAL INDEBTEDNESS.—(a) The agriculturist is deeply indebted. The average size of a holding is not adequate, and its produce is not usually sufficient for his needs. The rate of interest which he has to pay is very heavy, and it varies inversely with his resources. The

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agriculturist lives a hand-to-mouth life and has to face occasionally the stress of bad weather and poor harvests, and is also required to make provision for marriages and other social functions. Once in debt, it becomes impossible for him to get out of it. He ordinarily borrows money from the village moneylender or zamindar. He is often obliged to take a loan from the dealer, to be repaid by his crop at harvest time when prices are very low. The amount goes on augmenting at a high rate of compound interest; so the debt is never completely liquidated.

(b) I feel that the agriculturist cannot be saved and set on the road to redemption or advancement until he is relieved from the village moneylender. No bank can advance money to him on a reasonable rate of interest, nor can the system of co-operative credit be applied successfully so long as his debts are not cleared, which no society at the outset can afford to do. I strongly recommend that the Government should liquidate the debt and recover it with interest at, say, 8 per cent. by means of easy instalments in case of solvent agriculturists. It should be the first charge on the crops, implements and holdings, and if any tenant is in default as regards payment, it should be open to the Collector to confiscate his holding and to settle it on another agriculturist, without prejudicing the rights of the landholder. It should not be difficult for the Government to raise a development loan for such a purpose at 4½ to 6 per cent. So, if proper care is taken, there should be little risk involved in such an arrangement. The cultivator, after he has been once redeemed in this manner, should not be allowed to raise any further loan except for real necessity. If such a suggestion is adopted, it will be necessary to take special measures by means of legislation. All details will have to be worked out. It will be wholesome to restrict the credit of cultivators, but it will not be equitable to do so so long as his previous liabilities are outstanding. The extent of agricultural indebtedness is very great, and the suggestion that I am making is not very easy or simple; but I am convinced that unless some bold step is taken in this direction, we cannot begin the constructive process. I would urge that it should be tried, at least in selected areas.

QUESTION 7.—FRAGMENTATION OF HOLDINGS.—In the present state of agricultural poverty and lack of other avenues for employment, it is difficult to prevent fragmentation. Legislation can prohibit the sub-division of a holding through the courts where it reduces the size below a certain minimum, but no law can prevent co-sharers in a holding from sub-dividing it by mutual consent. The law of inheritance is too deep-rooted to admit of any tampering in any form.

(b) Some little fragmentation of the holding is unavoidable on account of the different kinds of soil and the allocation of different blocks to different crops, but there is still enough of room for consolidation. Protracted inquiries by responsible officers have led them to the conclusion that at the present stage no compulsion can be helpful. Persuasion and propaganda are, therefore, the only available means for securing this purpose.

QUESTION 8.—IRRIGATION.—No efforts have been made for the extension of irrigation channels from the perennial streams in Kumaon. The surface of the mountains being naturally steep, even a short break in the rains produces disastrous results. The system of irrigation should be adopted by means of channels from the running streams.

QUESTION 9.—SOILS.—In view of the extensive canal projects in the United Provinces it will be worth while to investigate the causes of the formation of alkali soils, which will enable us to guard against serious damage.

QUESTION 10.—FERTILISERS.—Considerable impoverishment of land must occur due to increased pressure of crops; and as a consequence of the

tremendous exports of grain crops which are continuously removing large quantities of fertilizing ingredients from the soil, never to be returned into it. In addition, export of large quantities of oil seeds and cakes leads to serious depletion of fertility, not only by direct loss due to their non-use as manure, but still more by deterioration of live stock. The question of difficulties attendant on the export of liquid oil must not be allowed to stand in the way of progress. Another argument, that restriction in the export of oil cakes will affect the direct income of the cultivator, cannot also hold, because the increased fertility of his land due to manuring and improvement in his live stock will more than compensate for this. Then again the export of bones is causing irreparable loss to the country, and should forthwith be stopped.

(b) In the neighbourhood of forests ample fuel should be provided to the cultivators, and in other places arrangement should be made for planting groves for the supply of more fuel.

QUESTION 11.—CROPS.—(a) (iv). Wild animals cause considerable damage to crops, especially on the outskirts of the forests. The method of protecting crops by means of masonry walls erected on the borders has proved successful in certain parts of Terai and Bhabar estates. The system should be extended, and where masonry walls cannot be had wire fencing should be set up. Some experiments were recently made by some zamindars of Kashipur, and they proved quite effective. Licences for fire arms should be given freely to villagers living in villages near forests. Considerable damage is done to the crops by wild beasts in Kumaon, and even some persons are killed annually by them; in some cases one single tiger or leopard is known to have killed a considerable number of human beings. Arms licences should not be refused to those who want them, and not only muzzle-loading but also breech-loading gun licences should be freely sanctioned. Besides, there should be no restriction in the matter of shooting wild beasts by arms licence holders.

QUESTION 14.—IMPLEMENTS.—Improved implements of simple types have good scope, but the use of extensive labour-saving machinery will be only limited owing to human labour being easily available. Implements should, however, be within the means of the cultivator; costly or complicated machines are not suitable.

(b) Convincing demonstrations in the economy and use of the implements and financial assistance are essential. Implements may be supplied to cultivators on the instalment system or on hire. There are practical difficulties in replacing the indigenous implements wholesale. Mechanics cannot be found in villages to repair them, parts cannot be obtained in the rural areas, holdings are not compact and the cattle are not strong enough to work heavy implements. Indigenous implements have stood the test of time and, so far as possible, they should be improved, as very few people will be able to make use of costly or novel substitutes. Substantial encouragement should be given to Indians for investment in manufacturing enterprises, and effective steps should be taken to turn out well-trained agricultural engineers.

QUESTION 17.—AGRICULTURAL INDUSTRIES.—(a) About nine months in the year; in the slack season he has nothing to do, all industrial avenues being blocked.

(b) Demonstration and propaganda and facilities for technical training and marketing of commodities. Handspinning and handweaving can be universally introduced. These do not require any great training or skill, and do not call for costly tools. They will not be an innovation but will be things familiar to the countryside, and people can take to them with alacrity. Raw material for spinning can be had everywhere. It is difficult to

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imagine a simpler and more suitable form of industry capable of universal introduction which can usefully employ a man or a woman whether old or young, strong or infirm, in his or her idle hours. Subsidiary agricultural industries that can be adopted in Kumaon with Government aid are bee culture, sericulture, basket work, fruit preserving, making raisins, &c., from grapes, working up hemp and other fibre materials, spinning and weaving of wool.

(c) Lack of capital, of technical knowledge of the economics of production, transport and marketing difficulties, and restrictions imposed by the Forest Department.

(d) Yes, as long as the people are not sufficiently aroused to stimulate private initiative.

(c) Undoubtedly. The German beet sugar industry owes its success chiefly to agricultural workers finding employment in factories during the idle period.

QUESTION 18.—AGRICULTURAL LABOUR.—There is a shortage of agricultural labour in the Terai and Bhabar Government estates. Labourers are generally offered a large advance by the cultivators to tempt them to settle there. In order to prevent them from leaving the village, agreements were obtained from them in writing and action under the Workmen's Breach of Contract Act was taken, in some cases every year, to fetch back the absconding labourers. This Act has been abolished by the Legislative Assembly and the cultivators are as a body upset on this account. It indicates that, left to themselves, the labourers would perhaps not like to stay there.

As I have stated elsewhere, there are extensive tracts of cultivable land in the estates which are lying waste. The main difficulty is the climate; it is very unhealthy. If effective measures were taken to remove the malarial drawback by a suitable system of drainage and pure water supply, and sanitary residential buildings were provided, it would go a long way to mitigate the present difficulty. If zamindari rights are conferred on the farmers who settle there, it would serve as an irresistible attraction. Measures for the improvement of the health conditions of the tract, along with a liberal system of land tenure, will facilitate the development of this area.

QUESTION 19.—FORESTS.—Forest lands are ordinarily worked in the manner best suited to their exploitation by the Forest Department and not out of regard for agricultural progress or interests. In Kumaon there has been constant friction between the agricultural population and the Forest Department owing to the apathy of the Forest management towards the agriculturist. So far the Forest Department has cut away and sold large natural forests and have planted comparatively very few. In reserved areas the facilities for grazing given to villagers are not adequate. As the department ordinarily does not limit the number that can graze on paying fees and strictly restricts the rights of the villagers, it appears that the number of villagers' cattle is not limited because the forest cannot stand any further grazing. The department would not shrink from levying fees or enhancing them, if such action added to its income, however harmful it might be to larger agricultural interests. It does not hesitate to dispose of forest produce needed for agricultural purposes to traders who export it in large quantities from the neighbourhood of villages to distant places. This materially hampers the villagers in their every day work for a considerable time.

The rules of the Forest Department are very rigid and the lot of the villagers living in the neighbourhood of forests is often unenviable. In some cases boundary pillars of reserved forests stand on the edges of cultivated fields, leaving no room for extension of cultivation. If cattle stray into the forest they are sent to the pound though there be no fence or wall separating the forest from the village land.

Agricultural lands are also included in the forests sometimes and even when they are of little use to the Forest Department they are not restored to the agriculturist if once the department has got hold of them. The policy of rigid reservation of forests in the midst of disarmed people is fraught with serious danger as it leads to the destruction of crops and cattle and even human life, sometimes the number of men and women killed being tremendous. Rural economy should not be disturbed so far as possible and the needs and requirements of the agricultural people in the neighbourhood should receive primary consideration in the matter of forest management in every legitimate manner, and it should not be costly. Lands which are not fit for agriculture but can be used for afforestation can be profitably utilised for this purpose.

QUESTION 20.—MARKETING.—The agriculturist seldom takes his farm produce direct to the market. It is ordinarily his practice to borrow money for seed and for his maintenance while the crop is growing. As soon as the crop is ready, his banker gets hold of almost the entire stock, which he values at a substantial discount, and after meeting the immediate demand on account of rent and water rate, etc., he sets it off against the outstanding amount, charging interest at about 25 per cent. per annum, and strikes the balance which goes on accumulating and expanding during the next six months. By far the vast majority of cultivators are victims of this process by which the entire stock is absorbed on the threshing floor. He cannot be assisted or relieved materially by means of elaborate bulletins. Some remedy should be found for his indebtedness and the Government should take up the question of liquidating his debts or offering security therefor to his creditor. This is the most stupendous obstacle to agricultural progress, including free movement of agricultural produce to the best market.

(d) Marketing of agricultural products should be organised on co-operative lines and such information should be made available to the agriculturist through associations, though this can be introduced in very few localities for some time to come.

QUESTION 22.—CO-OPERATION.—The Report of the Committee on Co-operation published last year deals with this subject exhaustively.

Apart from the moral and material drawbacks to the growth of the co-operative system on normal lines on account of poverty, ignorance and lack of the spirit of self-help fostered by a bureaucratic Government, the indebtedness of the tenants is a serious obstacle. Co-operative societies cannot prosper when the members are indebted to other creditors. While experiments may be made in all directions wherever feasible, the department should concentrate on rural credit societies. Legislation in the cases mentioned in sub-section (c) seems desirable.

QUESTION 23.—GENERAL EDUCATION.—The existing system of education is too literary and theoretic. It is not related to the environment in which the students grow. It does not take account of the needs of the classes who attend school. It creates a sort of aversion for manual labour and does not develop the spirit of courage, enterprise, initiative or constructive effort, in as large a measure as is necessary.

The agriculturist should be kept in touch with his vocation by practical operations at every stage of rural education, as I have suggested in the beginning. Compulsory education has not been introduced in any rural area in this province so far. Apart altogether from those who are handicapped by lack of facilities for education, the boy who gets through the primary class is not palpably and demonstratively more efficient and productive than one who gives up school earlier or does not care to join it at all. The system naturally does not rouse any enthusiasm among the masses steeped in colossal poverty. If the system of education is purged of its foreign element and if it is shaped so as to develop a bias towards national requirements, the difficulty will be overcome to some extent.

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QUESTION 24.—ATTRACTING CAPITAL.—(a) Propaganda, demonstration and extension of facilities for adopting agriculture as a vocation.

(b) Lack of means and want of enterprise and knowledge.

- QUESTION 25.—WELFARE OF RURAL POPULATION.—(a) The supply of pure drinking water should be attended to. People are too poor or too apathetic to insist on pure water. In the hill parts of Kumaon, drinking water is frequently contaminated at its source. A pure water supply will considerably improve health in rural parts. Lantern shows, child welfare and maternity schemes, the giving of facilities to educated people, and the grant of subsidies to qualified medical practitioners to induce them to settle in rural areas, lectures on hygiene, temperance, &c., and circulating libraries, are some of the measures which can be introduced to improve the lot of the rural population. The Government should also endeavour to build up model villages in suitable centres.

(b) Economic surveys should be conducted by Government through combined official and non-official agency. They should comprise an inquiry into the economic factors, such as the total wealth of the village, annual income, the standard of living, the amount of debt, the condition of livestock and implements, the nature of the land tenure, professions followed, crops raised, revenue, rent and produce per acre in different classes of soil, extent of irrigated land, average longevity, vital matters regarding infant mortality, birth and death rates, &c., age and cost of marriage, &c., number and ages of widows and orphans and their means of living, literacy and facilities for education, use of manures and fertilisers, injury by wild beasts, rates of interest, nature and value of buildings, rural sports, games and festivals, subsidiary industries, vital statistics regarding cattle, veterinary arrangements, marketing of agricultural produce, facilities and condition of communications, sources of water supply and their condition, stocking of manure and system of drainage, immigration and emigration, means of irrigation whether by canals, tube wells and masonry or *katcha* wells, home-made and foreign cloth used in the village, persons working abroad, money received from work done in other places, number of zamindars, tenants, labourers and extent of holding of each class, zamindars residing in the village and their qualifications, pursuits and pastimes, exports and imports, proportion of males and females, adults and children to population, proximity and effects of forests, &c.

QUESTION 26.—STATISTICS.—The Government of India should organise a department of statistical audit, the main function of which will be the examination of the information collected by Local Governments. The department should be under the Legislature and independent of the executive Government. In every case, special pains should be taken by responsible officers to test the veracity of the statistics collected by local officers.

Oral Evidence.

36,995. *The Chairman:* Pandit Govind Ballabh Pant, you have been good enough to provide the Commission with a note of the evidence that you wish to place before us. Would you like to supplement that by any statement at this stage?—I have no specific suggestions to make except one that was brought to my notice only yesterday by some of my friends who have asked me to tell the Commission that the customs duty on wire fencing which is used for the protection of crops against wild beasts is 15 per cent., while that on the wire itself is 5 per cent. I am not prepared to vouch for the accuracy of these figures not having been able to check them myself, but if that is so, I think that it is a matter which might be taken into consideration. There is also another point which was reported to me though I have not myself seen the report. I was told that certain

statements had been made by some witnesses, at least by one witness, questioning the competence of the District Boards to deal with primary education.

36,996. We might have a discussion about that later. Would you first tell the Commission what district you come from?—Nainital.

36,997. And have you, yourself, farming experience?—I have never been a practical agriculturist, but we have small holdings of our own and I have been in touch with them.

36,998. You have been brought up amidst rural surroundings?—Yes.

36,999. You point out on the first page of your note of evidence, in answer to Question 2 (2), that it is your view that there is an urgent need for the extension of teaching facilities in many districts, and then you say there is only one vocational school at Bulandshahr in addition to the higher grade college at Cawnpore? Are you familiar with the school at Bulandshahr?—I have heard of it and have studied the question in my public capacity, but I have not been to the school myself.

37,000. At what stage in a boy's career do you suggest that he should go to such a school as Bulandshahr?—I think, as soon as a boy completes his primary stage, if he is given a training for about three years in a vocational school that would be quite good.

37,001. That would take him up to about 12 in the case of the average boy?—It would take him to about 15 years.

37,002. Before he leaves the primary school?—No.

37,003. He would go at 12 and leave at 15?—Yes.

37,004. Are you aware of the age at which most boys go to Bulandshahr?—I do not know the age exactly but I fancy that there are two classes of students in the Bulandshahr school, teachers who are already in the profession and who are educated to receive training there so that they may train boys in the agricultural methods in primary or middle schools. For that of course there is no age limit; and the others, I presume, are ordinarily between the ages of 15 and 18.

37,005. Your idea is to extend a type of education which would give a vocational flavour to the curriculum when a boy was about 15 years, or from about 13 to 15 years of age?—Yes; they would not be agricultural experts, but they would be good farmers.

37,006. Are you a member of the District Board?—Yes.

37,007. Have you had long experience of District Board work?—Yes, I have been a member for about eight years, I think.

37,008. In your view is the District Board, as at present constituted, a satisfactory body for dealing with educational problems in the district?—The District Board has got expert advisers such as Deputy Inspectors to look after the schools and, as far as arousing an interest in education or spreading it goes, there is no better machinery available. Nothing is perfect.

37,009. The position is that since the Reforms you have an unpaid Chairman, and one Secretary who does the general secretarial work?—Yes.

37,010. Do you think it would be an advantage if you had a sub-committee to the District Board with an Educational Secretary at the service of that sub-committee?—The District Boards have got the power to form educational sub-committees and ordinarily they do.

37,011. Does your Board do so?—Yes.

37,012. And is there any secretarial assistance available?—We had the Deputy-Inspector of Schools as the Secretary of that committee, I myself being the Chairman for some years.

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37,013. Do you find that works satisfactorily?—When the Government does not issue illogical rules, these sub-committees can work very well.

37,014. Have you any suggestions to make for the improvement of the equipment of District Boards for this particular duty?—The District Boards have not got sufficient funds at their disposal.

37,015. That is the main trouble, is it not?—Yes, and unless they are financed, it is not possible for them to have the schools equipped as efficiently and adequately as they ought to be; unless they are helped by the Local Government in that matter, I do not think that any other process can prove fruitful.

37,016. What would you say to the proposal that the Government, on the advice of the Education Department, should be in a position to nominate to the education sub-committee of the District Board say one or two gentlemen, not members of the Board, who happen to be interested in education?—What would be the strength of that sub-committee? So long as they do not go beyond 25 per cent. of the members, it would be all right.

37,017. So you would favour the principle of nomination to that extent?—I would have no objection, provided the men that are put in are persons qualified to give advice on educational subjects and not those whom District officers want to pamper simply by giving them places of public distinction.

37,018. What do you find is the order in which public opinion, so far as it has developed in your district, is interested in various directions of expenditure? Do you find for instance that they are most enthusiastic about education, or about roads?—Since the constitution of these District Boards was reorganised, that is since 1922, there has been some awakening. Before that year we had only nominated members and the public had little to do with the working of the Boards except in so far as they were directly affected by the roads or the schools. There is, I think, a wider and a stronger desire for schools and roads than in former days and people know that they must approach the Board for these needs and, in my capacity as a member of the Board as well as of the Council, I have been receiving letters from time to time asking me to add to the number of schools, to improve the roads or to give more of them.

37,019. So that you do see signs of a quickening interest?—Yes.

37,020. Is most of this interest directed towards a particular subject, say roads or education?—There are three subjects which generally attract public attention, roads, schools and dispensaries.

37,021. That is to say, dispensaries for the population, not veterinary dispensaries?—Dispensaries for human beings, not for cattle.

37,022. Would you kindly turn to page 348 of your note? You point out that you think that there is a possibility of extending sheep breeding? I wanted to ask you about this sheep breeding in the Kumaon Division. What is the practice with regard to sheep-grazing on the hill sides?—The Kumaon division consists of the hills as well as the submontane tract. Of course there is no sheep breeding in the submontane tract, nor in the lower altitudes of the hill tract; there was a little but that has been stopped, because the Forest Department would not permit sheep and goats to graze in the reserved forests. So there is sheep breeding only in the higher altitudes which adjoin the Tibetan border and there they keep sheep and goats. They use them as beasts of burden for carrying goods to the lower territory and also they sell the wool.

37,023. Do the graziers who own these sheep shear them and bring down the wool to the factories, or how is the wool marketed?—Formerly it was all brought to some central places in Kumaon and was disposed of by the middle-

men. Now some of them enter into contracts directly with the Lalimli Factory at Cawnpore, while others, I am told, take their consignments even as far as Bombay and Calcutta; it is also purchased by the local men.

37,024. When you suggest there is opportunity for the improvement of the quality of this wool, are you thinking of selecting a better type of sheep?—Yes. One of my friends got some Australian sheep.

37,025. Do you happen to know what breed?—I do not know the breed, but he tells me they have been tried and are yielding wool of superior quality.

37,026. Are they the progeny of these Australian sheep and the local sheep?—The Australian sheep have stood the climate; there are very few of them so far, but they are thriving, and if the Forest Department permits their grazing in the forest, if a good number are imported and the Agricultural Department is able to point out the best localities for sheep breeding, I have no doubt the industry will flourish.

37,027. Have these crosses lived through twelve months, a whole season?—Yes, they have been there for two or three years.

37,028. Is the system of shifting cultivation practised at all in your district?—In my district there are various classes of people and even the methods of cultivation vary; in some parts, where there are primitive people there is a system of shifting cultivation in this sense that they occupy a village for three or four years, and then leave it and settle down somewhere else for the next three or four years.

37,029. But beyond that there is no particular tribe living by shifting cultivation?—No, there is not; there is rotation in the ordinary sense, with perhaps longer intervals here and there, but there is no shifting cultivation.

37,030. I want to take you one step further in the argument which you present on page 349 of your note in regard to Government in its action towards rural debt; you suggest that Government should liquidate the debt, that is to say, take over the debt, and recover it with interest at say 8 per cent. by means of easy instalments in the case of solvent agriculturists. I do not ask you for the detailed proposal that you would put forward, but I want to know whether you had considered the advisability, once the Government had taken that step, of limiting further borrowing?—Yes, I have said that.

37,031. You are definitely of opinion that that would be necessary?—Yes, I would adopt it, because if we leave the agriculturist free to contract debts to an unlimited extent after that, we should be giving him perhaps a licence to go upon what we have done for him.

37,032. I read your note carefully; you say that the cultivator, after the debt has once been redeemed, should not be allowed to raise any further loan except for real necessities. Of course, the real necessity for further borrowing would come at the very beginning of the next season; that is the difficulty, is it not?—I do not quite follow.

37,033. Having liquidated the debt and made arrangements to recover capital and interest, and assuming that that is a practicable policy, you leave your cultivator, of course, with the duty of refunding, on the scale agreed upon, what Government has, in fact, lent him; but, over and above that, he has to provide himself with capital to finance his next year's crop, has he not?—Yes.

37,034. Do you think the cultivator would be in a position to pay this 8 per cent. and to finance his next year's crop without further borrowing?—In most cases he must be able to do so.

37,035. That is your view?—I will give an illustration. At present suppose the agriculturist raises a crop worth Rs.200, and the creditor takes away

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from him Rs.80 on account of interest at the rate of 2½ per cent. per month, and some Rs.20 on account of principal; he is short by Rs.100. For the same debt, the moment it is taken over by the Government I think he would be given a much longer time, so that the instalment that he has to pay would not exceed Rs.30, because the rate of interest would be very low and the principal would be distributed over a very long period; he would thereby be saving at least Rs.70. That Rs.70 he could divert to productive purposes, and I do not think he gets credit for more than that during the harvest time or during the period of one crop.

37,036. I want you, if you will, to develop your statement on page 350 of your note as to the damage wrought by wild animals in the forests in the districts that you know. What animals give the greatest amount of trouble in your district?—Deer and pigs mostly.

37,037. Which do most damage?—It depends on the nature of the crop and the season of the year.

37,038. Is there much loss of life from wild animals in the district? You say the number of men and women killed is tremendous?—It depends on the mentality of the person considering the question; one who is full of sympathy for human life feels staggered when he hears of 100 men being killed in the course of a year; another who is callous towards life, especially Indian life, would not mind it at all.

37,039. But I am concerned, if I can, to discover the sort of risk to human life that exists in your own district?—It is considerable in my district.

37,040. Can you give us the figures at all?—I could, but I have not got them just now; I could give it you from the reports.

37,041. From carnivora entirely, is it?—Yes.

37,042. Are there any accidents from pigs?—Last year there was one that I know of but the man was saved.

37,043. Have you read the report of the Oakden Committee?—Yes.

37,044. Do you agree in the main with that Committee's findings? If you would rather not commit yourself, please say so?—I do not think the methods of co-operation that are being followed can be effective, but, within the limitations that are imposed, they seem to give us some practical way out of the present difficulty.

37,045. Have you an active co-operative organisation in your own district?—Yes, there is one in some part.

37,046. Are there co-operative credit societies?—Yes.

37,047. Do you think they are healthy?—Yes, in my district, in the Tarai, they are healthy, so far as the question of credit goes.

37,048. Are the primary societies reasonably vigorous?—They are solvent.

37,049. Do their Committees take an active part in managing the societies?—I may just say how the relations between the officers and the people stand there; the estates belong to Government; the members of these bodies are generally the tenants of the estates, so that the Government officers are practically the landlords and these people are the tenants. They have been working under the guidance of the Government officers and they may have imbibed something of the co-operative spirit now, but these societies have been working mostly under the influence of the Government officers.

37,050. Do you happen to have taken any active part in the co-operative movement yourself?—Yes, I have been attending the annual meetings; I have been watching it closely.

37,051. Are you referring to the annual meetings of the Central Bank, or what?—Of the Central Bank, when the members of the various societies are

invited. There were some other societies which were started in the zamindari area, but the tract being precarious they did not thrive.

37,052. *Sir Henry Lawrence*: I see on page 346 of your note you advocate that advances should be made to educated young men for the establishment of farms?—Yes.

37,053. Has anything of that kind been done in any part that you know of?—A society was formed in Calcutta under the auspices of the Social Welfare League which I read about in the papers, but it was a private body. So far as this part of the country is concerned, I am not aware of any concrete instances. There has been some progress on these lines in other countries.

37,054. On what scale do you advocate that this experiment should be tried? What area of land would support these young men?—I am prepared to begin with a holding of something between 10 and 20 acres for one individual.

37,055. And you think he could make a living off that, do you?—It would depend on the use that he can make of that land; if he has got other means, if he has got enough capital, can resort to intensive cultivation and can find enough water, I think he can make a living.

37,056. Is there available, at the disposal of Government, land for this purpose?—In the malarial tract of Government estates the Government has got ample land.

37,057. In what district?—In my district of Nainital.

37,058. That is Government land, is it?—Yes.

37,059. You do not know the tenure there? Is it not *talukdari*?—No, it is Government land entirely at the disposal of Government, no one else having any interest in the uncultivated land.

37,060. You call it a malarious tract? Is malaria very serious?—Yes, very serious.

37,061. Could you get the young men to go there?—No; I would not advise them to go there so long as the climate is very bad.

37,062. You want Government first to improve the climate there?—Yes, for the benefit of the present agriculturists and for the benefit of those who may settle there hereafter.

37,063. What sort of measures are necessary for the improvement of the climate?—Better drainage, and removal of vegetation and other superfluous growth which is of no use to anybody.

37,064. Has any malarial survey of this kind been made?—Yes, there has been some survey recently and an officer has been working there, the Director of Malariology. He has submitted a report in connection with that but no action has yet been taken on it.

37,065. Do you know the financial aspect of this proposal, what it would cost to improve these lands from the malaria point of view?—It will largely depend on the area that is tackled.

37,066. Some scheme has been prepared; is that so?—I hope so; otherwise a man would not have been there getting a fat salary every month.

37,067. You have not seen such a scheme?—I have asked for it, but I have not yet got it.

37,068. On page 347 you speak of the tube well system, which cannot be said to have succeeded because of its prohibitive cost. Could you tell us anything about this tube well system?—It costs about Rs.14,000, on an average, to set up a tube well and the man concerned has himself to find something like Rs.8,000, the Government contributing something between Rs.5,000 and

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Rs.6,000. The area that can be irrigated under it is not very large; unless there is intensive cultivation it is of no use; I do not think it would pay.

37,069. Who profits by these tube wells?—Those who are making the experiments can satisfy their curiosity.

37,070. Cannot you give us some information?—They are being tried with the best of motives. The zamindar on whose land it is set up profits to the extent that he can make use of the well.

37,071. He is getting a subsidy from the Government?—Yes; in some cases he gets a loan. In the case of every tube well there is some contribution by the Government, if not directly at least indirectly. A very huge staff is maintained, which costs a considerable amount.

37,072. Your view is that it is an unwise policy?—I think that, situated as we are, it is costing us too much.

37,073. Therefore it is unwise?—It is impolitic.

37,074. *Sir Ganga Ram*: To what depth do you go in the case of the tube well?—I do not know anything about the technical aspect of it.

37,075. You say it costs Rs.14,000; what is the size?—I have seen in the reports of the Agricultural Department that for an average well they provide Rs.14,000.

37,076. You do not know the dimensions?—I can give you the details from the report, but not from my own personal knowledge.

37,077. Is there any contractor for setting up these tube wells?—The method is this, so far as I am aware. The Government has got some engineers. Whenever a tube well is to be fitted, the man applies to the department who make a survey, prepare the plans and estimates, and if the man wants a loan he applies for it. Otherwise he looks into the estimate and provides the money himself. The work is supervised by the engineer maintained by the Government.

37,078. Whose tube wells are they?—Obviously the wells belong to those who bear the cost.

37,079. You can send us a note later on?—I will get you one from our Director of Agriculture.

37,080. He could not give us any figures?—Then in that respect I am no better posted than he is.

37,081. I think Rs.14,000 is much too high. The tube wells in our parts do not cost as much?—Perhaps they are too extravagant here; if you want a reference, I could give the reference from the report.

37,082. Can you send a memo?—I may do so, but I do not promise that I will, because I know very little about it myself.*

37,083. Do you know what methods they are going to adopt to exterminate malaria?—I understand they are going to appoint some doctors to improve the drainage.

37,084. The officer who is investigating is a doctor?—Yes.

37,085. Do you know what is the population there per square mile?—There are certain tracts where, for miles and miles, you will not find a single human being, and there are others well populated.

37,086. On account of malaria?—Yes, mostly.

37,087. Otherwise the land is good?—Yes, very fertile.

37,088. The water is good?—You can have wells and also irrigation canals in certain tracts.

37,089. Government is trying to colonise it?—No. There are some native inhabitants in those parts, and unless a regular stream of people comes from outside, there is dearth of population.

* Not received.

37,090. Outside people do not settle on the land?—They do not survive long, on account of malaria.

37,091. You are interested in education; up to what standard would you advocate education?—I would not impose any limits. I have no objection to everyone, who so wishes, becoming a graduate.

37,092. Everybody cannot be a graduate. When you start educating them wholesale, up to what standard do you educate?—I do not follow the question.

37,093. You say that the Government ought to start mass education; up to what standard do you recommend it?—Mass education is understood everywhere to mean primary education.

37,094. We have found in the last census report that the rural population, after two years of primary education, forget all about it when they go to their land?—I would not be surprised at it because most of the men drop out of the school after the preparatory stage.

37,095. You said just now that the Forest Department do not allow sheep grazing?—Yes, in their forests.

37,096. Is that right?—Yes, so far as I know of my parts.

37,097. That is the Tarai hills?—Tarai is a different place from the hills altogether. There are no hills in the Tarai and no Tarai in the hills.

37,098. *Sir Thomas Middleton*: You say that you have a small holding of your own. Does that mean that you are the owner of villages?—In our parts, fortunately, we have got the system of peasant proprietorship, and every individual has his own small holding.

37,099. You possess a small holding?—Yes.

37,100. But you do not work that small holding yourself?—No.

37,101. Do you own more than one small holding?—I do not know in what sense you are interpreting the word "holding." We have a few acres lying scattered about in the village; it is not a compact block.

37,102. What do you do with your land? Do you let it to some other villager?—Yes.

37,103. You yourself have no immediate connection with agriculture?—No; perhaps some would consider it undignified for myself, an educated man, to cultivate land.

37,104. You might have managed your land without compromising your dignity?—That I do in the sense that I get it cultivated by somebody who gives me something out of it.

37,105. But only this small area?—That is all.

37,106. So that your agricultural experience cannot be great?—No.

37,107. *Raja Sir Rampal Singh*: Do you think there is sufficient margin, in the income of a cultivator, between what he spends and what he gets on his cultivation?—I do not exactly understand what standard you apply to him. There are many people who are not getting more than a meal a day for working in the fields, and yet they make a certain saving on what they get out of the land.

37,108. I mean to say that, generally, the average cultivator seldom has any reserve?—He has not even the ordinary creature comforts.

37,109. If Government clears all the debts that at present hang over the cultivator, do you think that after some years his financial condition will greatly improve?—Yes.

37,110. Do you take into consideration all the calamities which the agriculturist has to face?—Yes.

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37,111. If some calamity befalls him, will he be able to discharge the debt without incurring further debts?—If the calamity results in his own death, then there is an end of all the trouble; but if the calamity results in the failure of one crop, he can raise another later on and try to satisfy the Government and himself. Any way, he will be in a better position than he is to-day. His present position is inconceivably miserable, and I want the Government, specially with the aid of this Commission, to devise improvements for meeting the biggest of the questions relating to agriculture and rural economy.

37,112. What difficulties do cultivators in your part of the country have as regards grazing?—As I have already said, in areas controlled by the Forest Department the numbers permitted to graze are limited, so that a man cannot keep a larger number of cattle than he is permitted to graze. Goats and sheep are excluded altogether from the reserves, and inside the reserves certain areas may be closed altogether to grazing. If a man has no rights and his cattle stray into the forest, they are taken to the pound, and he has to pay heavy damages.

37,113. Owing to these difficulties, cultivators in your part of the country cannot keep as many cattle as they would like?—In those areas which are in the vicinity of reserved forests that is so.

37,114. *Sir James MacKenna*: You are a member of the Legislative Council in this Province?—Yes.

37,115. How long have you been a member?—Three years.

37,116. What is the attitude of the Council generally towards the Agricultural Department?—Most friendly and indulgent.

37,117. Would you say that agricultural questions are not regarded as matter for party politics in your Council?—No, or you would not find me here, as the leader of the Congress Party in the Council. Anyone who knows the condition of the cultivators cannot be deterred by political considerations from doing what he can for their relief.

37,118. What is the attitude of the Council and the public generally towards the Veterinary Services?—So far as the public is concerned, many people are not aware of the existence of either veterinary science or the Veterinary Department. So far as the Council is concerned, it has not taken a serious interest in the matter.

37,119. I suppose the position is that many members of the public have much more faith in the old customs than in improved veterinary science?—Most people do not know there is such a thing as improved veterinary science, so no comparison is possible.

37,120. That is the point. They rely on indigenous methods?—They do not know of others.

37,121. *Professor Gangulee*: You show a good deal of interest in agriculture, though not yourself an agriculturist. Are you a member of the Provincial Board of Agriculture?—No.

37,122. Are you in any way connected with any departmental activities here?—As a prominent representative of one of the foremost parties in the Council, I have to take an interest in all these things.

37,123. Are you a member of the Provincial Development Board?—No. It has been asleep for two years and has not held a single meeting. Some members of my party are on the Board. Ordinarily I do not enter the departmental committees.

37,124. When it started you could not forecast what was going to happen. Were you a member of it then?—No.

37,125. You suggest that a similar Agricultural Development Board should be started?—Yes, in the hope that it will be more active. It would be on different lines.

37,126. Have you any definite suggestions for making such a Board an active organisation?—By placing money at its disposal and allotting particular functions to it.

37,127. With regard to agricultural education, do you know the Cawnpore College at all? Have you visited it?—Yes, I have been there, but I am not intimately acquainted with its work. I have seen the massive buildings.

37,128. Do you know any agricultural graduates from that college?—A good number of them.

37,129. Do you know them intimately?—Intimately enough to know of their misfortunes.

37,130. What do you mean by that?—Their inability to eke out a living; their looking here, there and everywhere for something to do.

37,131. I take it the potato is the chief crop in your district?—It is one of them.

37,132. Do you know of any demonstration farm in that district where potato experiments are being carried on?—There is none.

37,133. When you say you want Government to liquidate the debt, do you mean the Central or the Provincial Government?—Unless the Central Government assists the Provincial Government, the latter will not be able to do it.

37,134. You want the Central Government to do it?—I want the Provincial Government to do it with the assistance of the Central Government, or the Central Government to do it with the co-operation of the Provincial Government. I do not mind which.

37,135. Referring to the question of export of grain crops: are you in favour of not exporting grain crops from this country?—If I could solve the other difficulties that would arise, I would be, but at the moment I consider it impracticable.

37,136. Do you think you could solve the economic problems of the country by prohibiting the export of grains?—If we could make the country self-contained in other respects, we could then think of retaining enough for our needs and not allowing any export except of the surplus.

37,137. Have you taken any part in the co-operative movement?—A little.

37,138. In what capacity?—You may call me either an organiser or a member; I have served as both. I have tried to start some societies, to arouse interest in them and get members for them.

37,139. Have you succeeded in your efforts?—So far as zamindari areas are concerned, our societies have gradually dwindled, and when people were carried away by the influenza epidemic some years back everything was swept away and the societies failed.

37,140. You have actually formed a society in your district?—A number of them.

37,141. I am talking of primary societies?—Yes.

37,142. Are you in touch with them?—Yes.

37,143. I suppose you took a great deal of interest in demonstration and propaganda at the time of the *khaddar* movement?—I did not take very much; I wish I could have, but I had too much to do at the time.

37,144. Do you think hand spinning and weaving could be universally introduced?—It depends on the mentality of the people who are approached.

37,145. What do you mean by that?—So far as the simple rural classes are concerned, if I go to them and demonstrate the utility of even the

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few annas they might earn in their idle hours, they will respond to the call; but if I go to a haughty graduate, he may pooh-pooh the idea.

37,146. Was not intensive propaganda recently carried on to introduce spinning and weaving in rural areas?—Do you mean the Swadeshi movement?

37,147. I am referring to the Ghandi movement?—That was more comprehensive than the other.

37,148. Would you agree with me that intensive propaganda was carried on for the purpose of introducing spinning?—Yes.

37,149. That propaganda was supported by the Congress?— Yes.

37,150. What has been the result of that propaganda?—Conservative habits dies slowly. We have succeeded in demonstrating to some people the wisdom of adopting the mode of life which obtains in the villages, and we have perhaps induced some villagers to spend their idle hours in work rather than waste them, and we have set people thinking in proper channels.

37,151. Although you carried on intensive propaganda, you could not make very much progress?—I do not agree. The results so far have not been so great as we desired.

37,152. You expect results later on?—I am realising them.

37,153. I think you live close to a forest area?—In the midst of it, unfortunately.

37,154. You talk of constant friction. Are you referring to the friction of 1911?—It has gone on continuously.

37,155. It is still going on?—Yes.

37,156. What is the nature of it?—Large areas of open land were closed (something like 2,000 square miles), the number of cattle which could graze there was limited and the area over which cultivation could extend was restricted. The rules made for the exercise of the few privileges granted to people living in the vicinity were very stringent and the harassments of the lowest underlings were very difficult to meet. All these things contributed to the friction.

37,157. Do you speak of these things from personal experience?—Not as one of the victims, but as one who is very closely in touch with them.

37,158. *Sir Henry Lawrence*: Was this a new scheme of afforestation?—No, not so much afforestation as the reservation of existing forests.

37,159. Forests were newly reserved?—Yes.

37,160. In what year?—1911 to 1915.

37,161. What were they before?—Open forests, where the people had unrestricted rights. There has been some improvement since owing to the modification of the original scheme, and the friction is not so acute to-day as it used to be. Government has grown wiser, I think.

37,162. *Professor Gangulee*: You ask Government to build model villages in suitable centres. Has any model village been established by the prominent party to which you belong?—We have not yet taken over the government.

37,163. That is so; but as a non-co-operator, have you started any model village to show the people what they themselves should do?—We will do so the moment we get into power. Societies are being formed for this purpose in some provinces.

37,164. You are waiting for that?—Yes.

37,165. There is one sentence in your note which I do not understand. You say: "Apart from the moral and material drawbacks to the growth

of the co-operative system on normal lines on account of poverty, ignorance and lack of the spirit of self-help fostered by bureaucratic Government . . ." What do you mean by that last phrase? Who started the co-operative movement?—The Government.

37,166. What was the idea of the co-operative movement?—Government's idea was to improve the position of the cultivator, but there are basic causes working indirectly which hamper the movement.

37,167. Have you read the Maclagan Committee's report?—Yes.

37,168. They wanted to foster self-help among the people?—I consider it incompatible with the bureaucratic system of administration; you cannot develop that spirit. You want to make the people tame, docile and obedient, and your servants, when they go to a village, feel a little nervous about telling the people to rely on themselves and not to look to others for support; they feel they will be disturbing the administrative system if they create such a bold spirit amongst the people.

37,169. *Mr. Kamat*: As a member of a District Board, will you please tell me whether it is correct that District Boards, as a rule, hamper the Veterinary Services in carrying out their work of giving veterinary help to the people?—I do not think so.

37,170. We have been told that the Veterinary Department gets very little assistance from District Boards. If that is so, I want to know the reason?—At least that is not tantamount to hampering. We do not hamper at all. As to getting assistance I could not say that they get much assistance because much is never sought. I am prepared to admit that even the members of the Boards do not fully apprehend the potentialities of the Veterinary Department; but, as it exists to-day, it is not as useful as it ought to be, so the people have got only a lukewarm interest in it.

37,171. You say it is not as useful as it ought to be. Is that because it has not got the number of subordinates necessary for the area, or because the treatment which they give to the animals is not useful?—Because it has not got a sufficient number of subordinates and the subordinates that are there, are not always possessed of that genuine spirit of service which should inspire them.

37,172. Is there any prejudice or antipathy on the part of the villagers or on the part of the members of your Board against modern treatment according to veterinary principles?—There is no antipathy so far as those are concerned who know what veterinary science stands for, nor on the part of those who have actually derived some advantage from that sort of treatment. But there may be some sort of indifference on the part of those who are acquainted with it or who have not had occasion to try it.

37,173. Would the Local Boards like the control over the Veterinary Department to be taken away from the District Boards and vested in Government, or would they like to retain the control over that Department so far as the subordinates are concerned?—The District Boards would certainly like to retain that control.

37,174. You say in one of your paragraphs that agricultural experts should be inspired by a genuine spirit of service, understanding and sympathising with the unsophisticated Indian cultivator. From your experience do you think that the present Agricultural Department has not got any sympathy or does not behave with tact towards the cultivators?—I would not say that the department as such does not do so, but some individual members of the department are handicapped because of the want of knowledge; those who have not been living in the villages and who are not acquainted with the ways of the villager, do not behave towards him in such a manner as to win his sympathy and support.

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37,175. Do you think there is scope for improvement in the attitude of the members of the Agricultural Department in this direction?—An immense scope, I should say.

37,176. *Professor Gangulee*: How many experts have you in this Province in agriculture?—There is the Agricultural Service, consisting of agriculturists to look after agriculture proper; there is a service of Agricultural Engineers to look after tube and masonry wells; there is a service of men in the Veterinary Department. I do not know exactly which you have in mind?

37,177. *Mr. Kamat*: You say there should be an adequate scientific staff for the necessary work of the Local Government and the Government of India may render financial assistance to them, which it should do, at least so long as it does not completely remit the provincial contribution fixed under the Meston award. Do you mean to suggest that after the provincial contributions are wiped off your Government would stand on its own legs without any help from the Government of India?—No, I cannot envisage that day; what I meant was that even if the Government of India say that this is a provincial affair and they are not statutorily bound to help us, they would still be under a moral obligation so long as they are getting a contribution from us to give us adequate assistance. I say that they must contribute but I cannot urge them to do so after the contribution which we are making to-day is fully remitted.

37,178. About your proposal that Government should relieve agricultural indebtedness through a development loan and with reference to the question asked you by the Chairman, I want some further light. After the debt is liquidated, you want to restrict the credit of the cultivator by legislation?—Yes.

37,179. And you say no further loan should be granted except for a real necessity?—Yes.

37,180. Supposing some real necessity arises, where is the cultivator to go to?—It will depend on the system that you set up; there can be a number of ways. If the Government directly liquidates the debts, then he may have to approach the Collector. There is another thing which the Government may do: instead of paying down the amount at once, the Government may undertake the liability or at least guarantee the payment of the debt by easy instalments by the cultivator.

37,181. Quite: but knowing rural life as you do, you know that the cultivator has to go to the moneylender for money, not only for agricultural operations, but also for social functions, ceremonies and such like things, which inevitably take place off and on. In such cases when the real necessity arises, is the cultivator to go to the Government also, when, for instance, a marriage takes place in his family?—My idea is this, that after you have liquidated the debts the cultivators should form themselves into a society, under legislation they should be bound to rather, and whenever any money is needed it is primarily the society which should consider the application of the man, and if it is satisfied with it, then recommend it to the man who represents the Government in its dealings with the society, who should, after he has satisfied himself, forward it.

37,182. So that a part of your proposal is an intervening society?—Yes.

37,183. What I am surprised to find in your proposal is this: you want legislation to restrict the credit of the cultivator here. In another place also, you suggest that improved implements should be given on the instalment system to the cultivator, and there again you want the Government to take a bond from him restricting his credit. Belonging to the school of thought to which you do, do you think that this system of binding the cultivator hand and foot and hypothecating his crops to Government is either

desirable or feasible?—Am I to answer that question from the political standpoint or from the agricultural point of view? I was not influenced by any political considerations in submitting my note and will not let myself be led away by any remarks of that character even now. We have to address ourselves to more serious business in spite of the differences in political views which exist between yourself and myself. So far as the other question is concerned, I think the agriculturist is not only bound hand and foot, but he is in fetters and chains under the present regime, and the suggestions that I am making will at least loosen those chains, so that if he is bound hand and foot to the Government even then there are many other chains which will be broken, and I am prepared to advise him to make that change.

37,184. This sort of proposal would not make his position worse, but better?—His position to-day seems to me to be hopeless. It will greatly improve if my proposals are accepted.

37,185. What are the restrictions in the matter of shooting wild beasts that you are referring to?—Nobody can shoot any wild beast inside a forest unless he has acquired a permit on payment of the requisite fee; and certain classes of beasts cannot be shot, even outside, during certain periods of the year. There are also other restrictions, of course: one must obtain an arms licence and few can get it.

37,186. Speaking about the manufacture of implements, you say substantial encouragement should be given to Indians for investment in manufacturing enterprises. Cannot private enterprise manufacture agricultural implements?—I mean private enterprise helped by Government support. I do not rule out private enterprise altogether.

37,187. Here again you want Government help?—Yes, I want Government to help the agriculturist, from whom it derives its revenues, so long as it continues to tax him. I am keeping politics entirely apart from my mind and will not be deflected in the least. Government is helping even such a huge concern as that of Tata's.

37,188. Speaking about the Workmen's Breach of Contract Act, you think the repeal of that Act has been disastrous for the people of this Province?—No, I have never suggested that.

37,189. What are you hinting at then?—At this, that there is no freedom of labour, and there is a shortage of agricultural labour in the parts mentioned by me; and the reason seems to me that the tract is not healthy and the fact that people should deplore the repeal of the Breach of Contract Act, which in itself is a wholesome step, indicates that unless they resort to artificial methods they cannot get their supply of labour.

37,190. *Sir Henry Lawrence*: I did not quite follow you. Did you say that the repeal was wholesome?—Yes.

37,191. How are the cultivators upset by that repeal?—Because so far as they are concerned they cannot make use of the provisions of that Act against the labourers who run away from the farms without discharging their liabilities now, and, as compared with their personal loss, they do not care to appreciate the larger bearing of that policy.

37,192. *Sir Gunga Ram*: I did not quite understand your answer to my colleague: Do you think that the cultivation of land is beneath your dignity?—No, I did not mean to be serious. I only meant to indicate that under the present system of education we get a false notion about our dignity and think that it is not proper for us to do such work; it has given us a false sense of vanity in that respect.

37,193. Do you think that such graduates would take to hand spinning and weaving?—Not only such graduates, but also members of Commissions as far as I am concerned. They can set an example for others.

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37,194. Are you a lawyer?—Yes.

37,195. *Professor Gangulee*: You propose to float a development loan. Where do you propose to float it, in this country or in England?—It will depend on the purposes for which it is taken; it will depend on the terms and how you can get the money and from which market. If you are driving at something else, I am prepared to tell you that if it is necessary to raise money in England for the purpose of developing this country I am not going to be deterred by any racial considerations in raising the money there. The question is addressed to my political sense, I fancy.

(The witness withdrew.)

The Commission then adjourned till 11 a.m. on Monday, the 7th February, 1927, at Benares.

Monday, February 7th, 1927.

BENARES.

PRESENT:

THE MARQUESS OF LINLITHGOW, D.L. (*Chairman*).

Sir THOMAS MIDDLETON, K.B.E.,
C.B.

Sir JAMES MACKENNA, Kt., C.I.E.,
I.C.S.

Rai Bahadur Sir GANGA RAM, Kt.,
C.I.E., M.V.O

Mr. H. CALVERT, C.I.E., I.C.S.
Professor N. GANGULLEE.

Mr. B. S. KAMAT.

Mr. J. A. MADAN, I.C.S.

Mr. F. W. H. SMITH

} (*Joint Secretaries*).

Dr. RADHAKAMAL MUKHERJEE, Ph.D., Professor and Head
of the Department of Economics and Sociology, University
of Lucknow.

Replies to the Questionnaire.

QUESTION 7.—FRAGMENTATION OF HOLDINGS.—The evil of excessive fragmentation has been the result of the agnatic principles of succession among male heirs and the desire of equality, each co-sharer on a partition insisting on a separate share in each quality of the land in the village. Formerly the cultivation unit was the joint family land and partition was uncommon; now the economic solidarity of the joint family has been affected by the importation of individualistic notions of property. Indeed, the tendency towards sub-division which has been manifest in India only during the last few decades has been the outcome of the interpretation of Hindu and Mahomedan Law by English judges, with their strong predilections for individual succession to and private enjoyment of rights in land.* It may now be necessary to check repeated partition and wide distribution of scattered holdings by modifying the law of succession. The danger of morcellement has been found in one of its worst forms in France where the peasantry limit the size of families to maintain a not very high standard of living. In parts of Spain it is not uncommon to own and farm 16 or 17 acres divided into 80 to 120 plots scattered over a radius of three miles, and in another part (Vigo) there are many isolated parcels of 35, 25 or even 12 square yards.†

European measures against partition.—The problem is thus not peculiar to India and everywhere the social and economic effects are much the same. Let us examine briefly the attempts made by the agricultural countries in Europe to check repeated partition and wide distribution of scattered holdings. In Germany, the law encourages the practice among peasants of succession to undivided properties by the creation of a preferred heir (*Anerbe*). The laws creating an *Anerbenrecht* seem to be generally facultative, i.e., permitting, but not compelling, the registration of a property as subject to their provision; they apply to intestate succession only, and then only give the one heir who takes over the property of a certain preference

* For a full description of the question see Mukerjee: *The Foundations of Indian Economics*.

† Irwin: *The Making of Rural Europe*.

only in the proportion he shall receive (varying from State to State) directing that the others shall be compensated according to the agricultural profitableness of the estate and not its selling value. Partly for this reason and partly because the single recipient is given a larger share to begin with, the new law somewhat lessens the tendency of the peasants to incur debt on succession to a property. Nothing in the law prevents an owner from disposing of his property during his lifetime or by will; but the law of intestate succession undoubtedly strengthens the hold upon the peasant mind of his inherited preference for single succession to the farm. In Denmark the reconstituted State small holdings can be sold, but they cannot be subdivided, and the existing law puts insuperable difficulties in the way of adding one holding to another so as to make a large farm. Legally the owner can determine by his will which child shall succeed, and the value at which the farm is to be taken over and the other children compensated. To prevent the overburdening of the new farmer, the valuation laid down in the will may be below the "true value," i.e., the price at which it could be sold. There is, therefore, in the law a recognised preference for the chosen heir as in Germany for the *Anerbenrecht*. If the parent dies without disposing of the succession by will or otherwise, the State carries through a transference on the same principles. But, in practice, the matter is almost always arranged during the parents' lifetime. The farm very generally is transferred to one of the children, after a family council which comes to an agreement as to how much the preferred heir shall pay to the other heirs, and how much to the parents, in addition to their board and the exclusive use of some of the rooms in the farm-house. In most parts of Austria it is usual for the farm to pass to a single heir without any division of property and for a settlement to be made with the co-heirs by an indemnity in the form of a sum of money or mortgage. This practice is a survival of ancient Germanic law, the idea of which still is rooted deeply in the popular mind. As a rule, either the oldest or the youngest son inherits, according to the local custom. Even in those parts where a division of holdings is customary it is the rule that certain shares should be disproportionately large and that the heirs who have received less land should be compensated by a money payment. Generally speaking, the custom in Europe is to leave the property to a single heir, who gradually pays off the charge laid on it by the father for the benefit of the other heirs. If he finds the property unprofitable, he sells it undivided. Thus the size of the holdings does not diminish.

In Denmark the law of 1906 forbade the reduction of the area of a peasant farm below a certain taxable value which is roughly estimated as from 25 to 125 acres, but allowed these farms to be of four grades, a separate minimum being fixed for each grade. According to a new law which is now being proposed, no peasant farm, as existing at the moment of the passing of the law, may be extinguished or diminished in area without the sanction of the Ministry of Agriculture, and the period for which a farm or part of a farm may be leased without the sanction of the Ministry of Agriculture, is reduced from fifty to ten years. A small holding may not be extinguished or diminished in area below the minimum fixed for its grade, except with the sanction of the Ministry, and in the public interest evidently sanction will not be easily obtained in the case of a small holding. The four classes remain based on taxation, and equal to areas from about 12 to 35 acres; the smallest holding of rich land, down to 2½ acres, will be reckoned in the 12-acre class. No holding may be less than 2½ acres. Three small holdings up to about 30 acres in all of fairly good land may be held by one person, but the building must be maintained and no holding may be merged in another. The land is graded by official valuers, and official Inspectors watch over the observance of the law. Fines up to 2,000 kr. may be imposed for its breach.*

* Strickland: *Studies in European Co-operation*, Vol. II, Chapter V.

Thus, the Danes are contending against the evil of excessive as well as of inadequate size of holdings. Their measures prevent the sub-division of land below a limit which draws the line between the economic and the uneconomic holdings. These also seek to protect the peasant or the smallholder from being swallowed up by the wealthy from whom they have been carefully acquiring the land for settlement. According to the Russian Agrarian Code, 1922, the division of the lands among the family is allowed only when it is probable that new farms will be established for the benefit of the members who are withdrawing on lands which are assigned to them in the course of the division; if this is impracticable the movable property only is divided. To prevent such division as would destroy established farms by dividing them into two small units or otherwise impairing their efficiency, the Provincial Executive Committee, on the proposal of the provincial agricultural authority, has power to issue compulsory orders for limiting the excessive sub-division of farms. The lines of these measures are laid down in advance by the Commissariat of Agriculture. A member, on withdrawal from a holding which has been declared indivisible, has the right to claim payment in money or in kind for that portion of the stock that belongs to him, but not for the land share.*

It must be admitted that legislation of this character, though calculated to divert the surplus population from the land, would introduce a new principle into the land policy of India, where the idea of equal inheritance by birth-right has taken firm root in the popular mind. But the straits to which agriculture has been reduced as the result of the disparity between the increase of population and the capacity of the soil to feed it demand a drastic remedy. At present, in the more populous parts of the country, the conditions of agriculture are such that it is no longer profitable, yet the peasant, having no other occupation to fall back upon, tries separately to make both ends meet by continuously lowering his standard of subsistence, till he reaches very verge of starvation. At the same time, there is witnessed a condition of chronic under-employment in the villages. The burden of a disproportionate amount of semi-idle, inefficient labour lowers the efficiency of agriculture and delays the introduction of scientific processes and machinery. The introduction of a more elaborate rotation of crops or of subsidiary occupations or industries of a non-agricultural character no doubt would mitigate the problem of agricultural idleness which always co-exists with a low standard of living. Emigration or drift of the surplus population to the industrial centres of the country would similarly react on the conditions of agriculture and endow the people with greater staying power. Thus, the re-organisation of agriculture and industrial development of the country must accompany schemes of consolidation. In India we are apt to be misled by the ideas and practice of English agriculture, without considering the differences of economic circumstances between the two countries. Professor Jevons, for instance, advocates a policy of consolidation on the lines of the English Enclosure Acts. In the United Provinces, the density of population is three to four times higher than in England, and large farms cannot but mean expropriation and widespread distress in the absence of better opportunities of emigration and of industrialism. In England, large farms, large fields, straight fences, &c., have been for long a favourite scheme of English landlords and English writers, and no doubt, where there is capital and no redundant population, such arrangements are very desirable, but it should be remembered that to these large farms and large fields England owes her own Poor Laws.† Thus, a new land policy inaugurated by a

* M. Tcherknsky: "Agrarian Policy in Soviet Russia," *International Review of Agricultural Economics*, October-December, 1924.

† George O'Brien: *Economic History of England*.

change in the system of succession which would divert surplus population from the land requires to be introduced with caution, especially in regions where the density of population is extraordinarily high. Again, the scarcity of water supply is one of the most significant limiting factors in Indian agriculture. Where cultivation depends upon the uncertainties of rainfall, the scattered distribution of holdings in different soil areas is itself an agricultural advantage. In many parts of India we find that two or more staple crops are grown in dispersed fields in different soil areas, so that while a deficiency or an irregular distribution of rainfall may destroy one crop, there may be favourable returns from other fields. Indeed, the elaborate system of crop rotation which distinguishes Indian from Western farming has been possible chiefly because the holdings are dispersed. Thus, schemes of consolidation which do not take into account the local water and soil resources governing the field system and agricultural practice are bound to fail. The introduction of supplementary occupations and utilisation of raw materials in village workshops would smooth the transition from the old system of agriculture, handicapped by the pressure of population to a new economy where the soil would no longer be burdened with a population greater than it can support. In Belgium, the established custom is that the peasant family deposes one of the members in an annual rotation to undertake either industrial labour in the city or agricultural labour on another peasant's land. With increased size of holdings there must also come greater facilities of credit and better equipment than what the smallholder now possesses. In many tracts, one of the reasons why holdings are small is that few cultivators possess the necessary capital for purchasing the cattle and equipment adequate for farming on a large scale.

Thus, in India, we might introduce tentatively, as a first measure, legislation which would compel all villagers to accept restripment when a majority desire it. In Austria the scheme is forced on the rest if 66 per cent. of the cultivators agree to it; in Switzerland this is done if approved by 66 per cent. of the cultivators representing more than half the land, while in Prussia and Japan a bare majority coerces the rest.

Consolidation of holdings in Baroda.—In Baroda a permissive Act for the consolidation of agricultural holdings was passed in 1920. It cannot be made applicable to a village except when the two-thirds of the number of its total *khatedars*, who are the holders of not less than half of its total land desire to have it applied to their village.* Secondly, after readjustment the reconstituted holding, which will be the economic holding, should be regarded as indivisible.

The right of pre-emption has become customary law in many parts of India and should be made applicable to the economic cultivation unit. Thirdly, the economic holding will be held by the head of the family as family property, and regarded as impartible and exempt from seizure for debt, involving the consequence that a loan cannot be raised on the security of the holding. Fourthly, on his death, a preferred heir would succeed to the undivided economic cultivation unit and compensate the other heirs according to the agricultural profitableness of the farm and not its price at the land market. It has been suggested by the Baroda Land Holdings Commission that, with a view to prevent sub-division by succession or the separation of members of joint families, the inalienable holding, when succession opens out or a separation is being effected, should be sold at an auction at which only the co-sharers or reversioners should be permitted to bid.† This practice, however, would but lead to under-bidding

* *The Bombay Co-operative Quarterly*, December, 1923, "Consolidation of small and scattered holdings."

† *Misra*: "Report on the proposed consolidation of agricultural holdings," *The United Provinces Gazette*, May 31, 1924.

and over-burdening of the new cultivator, which would be a serious difficulty on account of the tendency of every member of the Indian cultivating family to keep a hold on the paternal estates. Thus, the German practice of the creation of a preferred heir and the compensation of the other members of the joint family according to the margin of agricultural profits and not the price at which the land can be sold seems more suitable to Indian conditions and this would not lead to any bitterness, while proving an incentive to an active and thrifty life on the part of the members of the cultivating families. A man may hold more than one of such re-adjusted economic holdings; but mortgages, sub-letting and other transfers tending to bring about sub-division should be prohibited.

Consolidation by voluntary exchanges.—In *pattidari* villages in Northern India, where the co-sharers are on good terms, voluntary exchanges of scattered parts of land and proprietary rights with the object of consolidating *quras*, *thoks* or *mahals* should be encouraged. *Chak-bat* (compact) partitions have been kept in view by the Board of Revenue, the United Provinces, and might still further be carried out whether the partition be perfect or not. Such partition may work on the basis of valuation as in Aligarh, thus modifying the allotment of various soil areas to all the *pattidars* in proportion to their shares. The Commissioners of Bareilly, Benares and Allahabad seem to have issued administrative instructions with a view to prevent *pattis* of smaller size than 5 acres, 25 *bighas* and 10 acres, respectively. But since the law prescribes no limit to the size of *pattis*, it is obvious that such instructions cannot achieve the desired end. Many District Officers report that *ichet-bat* operations are still the general rule, although in some partition proceedings lip service is done to the theory of *chak-bat* partitions by stating that the partition will be *chak-bat* as far as possible. The parties generally are averse from *chak-bat* partitions and the Partition Officers usually meet their wishes on the principle of least resistance. To induce the parties themselves to accept *chak-bat* partitions the District Officer of Ghazipur has introduced a plan of asking them to fix their own valuation as far as possible on the different kinds of land in terms of one another; as, for example, so many *bighas* of fallow land are equivalent to so many *bighas* of occupancy land, and so on. A similar method has been adopted in some of the doab districts with success, and the experiment deserves wide trial.* It must be pointed out that the intelligent and substantial cultivators in different parts of India adopt such practices to check the evil effects of the customary laws of inheritance and statutory laws of partition which combine to promote sub-division of the most extreme type. Thus, the secret of the success of the more prosperous cultivators lies in a determined adherence to the joint family system; the family affairs are managed by a *malika* who is selected as the most capable member of the family. If any member insists on partition, naturally, under Hindu Law, he is entitled to it, but every effort is made under the persuasion of a panchayat to divide up the property so as to accommodate the deserter in a different village.† Any legislation which would give a majority of villagers the option of preserving and even making compact holdings must accordingly find solid support in present habits and intelligent backing among the principal cultivators.

Regulation of exchange and partition.—Moreover, cases of exchange of contiguous rural property should be exempted from the usual stamp and registration charges as in some of the agricultural countries of Europe. On the other hand, transfers of agricultural land below the fixed standard should be refused registration if such transfer is not made to the co-sharer

* Government Resolution on the Revenue Administration, 1922-23, page 17.

† Knox: Report of the Revision of Settlement in the Gorakhpur District, the United Provinces, 1919.

or to the owner of the adjoining fields. Again, the courts should not allow the partition to be made if by so doing any of the shares would be of a lesser area than that fixed for a representative economic holding. Already in the Bombay Presidency the necessity for a limit for sub-division has been recognised. The limit fixed varies in different tracts and for different classes of land. In Gujarat it is one acre for dry crop land and half-acre for garden and rice land. Such limits are, however, too low and require to be raised in the interests of efficient cultivation. The conditions have become complicated in the zamindari provinces, where on account of the absence of fixity of tenures, such as exists in Agra and Oudh, the peasants have no desire to improve their holdings. Thus, the better and inferior class of tenants occupying medium or small sized plots of land are virtually in the same economic position, and there are constant transfers of holdings. Such economic circumstances perpetuating tiny holdings which are not economically self-sufficing are true not merely of Bengal, Behar and the United Provinces, but also of all areas where there has developed a long chain of middlemen dependent upon land. In many of these areas the introduction of economic holdings necessary for agricultural progress is impossible without a change in the land and revenue law. This, again, is impossible without the growth of a sound public opinion in regard to occupancy and non-occupancy rights and the social necessities of agriculture. An exchange or consolidation of holdings is impossible under the existing Tenancy Law of the United Provinces since occupancy tenants cannot be bought out. Where the land system stands in the way of re-stripment and consolidation, we have to depend upon the traditions of voluntary social co-operation. Such methods of solution are witnessed in the south, where there are villages which are re-divided annually. But the tendency here is more marked because of the established communal tradition. Thus, in Tanjore there are larger fields and holdings than in other districts. This points to a gradual consolidation of holdings under the supervision of the village panchayats, which also supervise the equitable distribution of irrigation water, the maintenance of village public works, &c. The exchange of plots of land so as to give the different owners contiguous blocks so far as possible is called *parivarthana* (Sanskrit—exchange) in Tanjore. It is difficult to come to an agreement because the advantages of plots as regards fertility, distance, irrigation facilities, &c., have to be equalised; and sometimes the rich peasant would refuse to exchange in such a way as to convenience a small neighbour, and the small owner is often at the mercy of his rich neighbour.* Similarly, in Travancore, consolidation of holdings is taking place, the tendency being for the owner of very small plots of land to sell them or to take more land on lease from others and thus enlarge the unit of cultivation. It may be advisable for the Government to initiate an experiment by acquiring villages under the Land Acquisition Act, re-align them properly, provide proper drainage and irrigation channels and then relet to the original tenants. This would furnish a valuable object lesson, though such lessons cannot serve the purposes of legislation or voluntary adjustment by the villagers themselves.

QUESTION 8.—IRRIGATION.—A careful examination of statistics of rainfall, irrigation and cultivated area in the United Provinces reveals, on the one hand, the striking dependence of agriculture on the monsoon conditions, and on the other, the limits of irrigation. From 1886-87 to 1894-95, there was an abundant rainfall in the Province, the average for nine years being 44·06 inches. This cycle of wet years was succeeded by two dry cycles, each of ten years' duration in the first of which the average rainfall was 37·33 inches and in the second 34·49. Molony† has given the following table

* K. Soundara Rajulu in *South Indian Villages*, p. 80.

† Molony: "Rainfall, Irrigation and the Subsoil Water Reservoirs of the Gangetic Plain in the United Provinces." *The Agricultural Journal of India*, January, 1917.

showing in acres the average areas irrigated during the same three periods:—

Cycle.	From wells.	From canals.	From tanks and other sources.	Total irrigated area.
Wet cycle	3,898,746	1,345,396	2,813,337	8,057,479
First dry cycle	5,293,490	1,900,037	2,501,084	9,694,611
Second dry cycle	5,921,314	2,299,310	1,991,204	10,211,828

With an abundant rainfall in 1916-17 there was a smaller demand for water than in the preceding year. This is shown by the following:—

—	From wells.	From canals.	From tanks and other sources.	Total irrigated area.
1916-17 ...	5,531,295	2,398,068	3,069,786	10,999,149

The area irrigated from tanks was greater and the area irrigated from canals and wells less in the cycle of wet years than in the cycles of dry years. In the second dry cycle the increase in well irrigation was 52 per cent., and in the canal irrigation 72 per cent., while the decrease in the tank irrigation was 29 per cent. In 1916-17 the total number of wells actually used was smaller than in the previous year and only 12,072 new wells were built as compared with 14,350 in the previous year and 19,692 in 1914-15. Since the beginning of the first dry cycle there has been a steady effort to improve the protection in areas dependent on wells. Between 1897 and 1917 no less than three lakhs of masonry wells have been constructed.

The result of this may be seen in the extremely dry year, 1913-14, when the rainfall was actually less than in 1896-97. In 1913-14 the total area under wheat amounted to no less than 6,376,670 acres, as compared with 4,931,710 acres in 1896-97. The serious failure of the crops witnessed in the latter year is almost impossible. With a continuance of heavy monsoons irrigation from wells shrinks owing to the labour and expense of lifting water. On the other hand, tank irrigation shrinks greatly during years of drought owing to tanks failing to fill.

But the two dry cycles have undoubtedly left the Provinces with a very much less efficient system of protection both in the matter of wells and canals. A comparison of the figures of canal and well irrigation now and at the end of the dry cycles will be of great significance:—

—	From wells.	From canals.	From tanks and other sources.	Total irrigated area.
1886-1887 ...	5,921,314	2,299,310	1,991,204	10,211,828
1923-1924 ...	4,252,443	1,635,865	1,994,574	7,946,258
1924-1925 ...	4,308,915	1,900,664	2,249,782	8,459,361

There has been a diminution under well irrigation by more than one-half million acres. In the first place, as ponds and *jhils* had sufficient water owing to abundant rainfall there was less need of sinking earthen wells than in the years of drought. Secondly, in areas such as are met with in Muttra, Agra and Etawah districts the deep water level has made well irrigation an expensive matter. Indeed the protection of these precarious tracts raises

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some rather serious engineering problems and the former methods employed, which consisted mainly of assisting landlords with advances, are not likely of themselves to be successful. The zamindar unaided by an engineer, will not be able to cope with the difficulties to be encountered, or to spend to the best purpose advances made to him for improvement of water supply. It may suffice to mention that in one tube well sunk in the Muttra district it was necessary to go down 350 feet before an adequate supply of water could be obtained. A comparison of statistics of well irrigation in Agra, Muttra and Etawah districts shows a continuous and steady decrease in the number of masonry and non-masonry wells. Doubtless in years of good rainfall this decrease is arrested but the relief is only of a temporary nature.*

Number of Wells.

District.	Year.	Masonry.		Non-masonry.	
		Actually used.	Available.	Actually used.	Available.
Agra	1924-25	6,390	12,110	23,165	43,059
	1916-17	6,885	11,667	32,362	57,762
	1911-12	7,015	11,244	36,489	58,508
	1905	—	10,500	—	—
	1875	—	8,056	—	62,566
	1840	—	5,263	—	—
Muttra	1924-25	3,150	7,261	11,276	20,876
	1916-17	3,503	6,993	15,526	26,838
	1911-12	3,417	6,521	15,290	23,387
	1907	—	9,847	—	25,000
	1879	—	4,999	—	35,151
Etawah	1924-25	4,367	7,523	8,253	11,475
	1916-17	4,255	6,614	12,887	15,812
	1911-12	4,330	6,506	11,775	15,464
	1907	4,408	6,047	12,393	15,057
	1875	1,067	—	33,794	—

The character of wells depends upon two factors, namely, the depth at which the water is found and the nature of water. Where the water-level is low, well irrigation becomes more expensive and shrinks. Again, where the water found is distinctly brackish, it is unfit for use in tillage. Brackish water can be employed for growing crops but is useless for preparing land for ploughing, as the salt prevents the seeds from germinating. Local experience has divided the water into twelve classes. Some of these are distinctly injurious to crops while others are not so when other seasonal conditions are favourable. In some tracts there has been an enormous fall in the well water level. In 1879 the depth of water in the Trans-Jumna tract ranged from 30 feet in Mat to 40 or 45 feet in Mahaban and Sadabad in Muttra district. In Western Muttra, near the Jumna ravines and Chhata hills, it was again about 30 feet, but along the centre line between these points it ranged from 45 to 60 feet. Since that time important changes have taken place. Owing to the famines of 1897 and 1900, the water-level sank considerably in eastern Muttra; and since the latter year its average distance from the surface has been computed at 50 feet in Mat, 60 feet

* *Season and Crop Reports of the United Provinces*

in Sadabad, and 75 in Mahaban. It cannot yet be decided how far it has risen in this portion of the district since the construction of the Mat canal, but in western Muttra the water level is now found to depend entirely on position with reference to canal. In the *ghat* tract in Etawah district the water-level varies from 60 to 80 feet, while in the *kurka* and in the *par* it was at so great a depth as to preclude practically all possibility of irrigation. The first of these tracts has now long been influenced by the canal, and considerable changes in the water-level have taken place but the water level in the *ghar* has not been appreciably affected by the construction of the Bhognipur branch. In Agra district the water-level is always very low in the high line tract above the Jumna. Across the Utangan in Bah, the depth at which water lies is very great, ranging from 60 to 80 feet in the west and from 80 to 100 feet in the eastern half; but the subsoil is usually firm and well construction is not hampered by the presence of sand as in Kiraoli. In south Khairagarh the water level has sunk considerably of late years, and is now about 35 feet below the surface on an average; while the nature of the soil frequently renders the construction of unprotected wells impossible. As the water level recedes in a particular tract, the cost of well construction increases and well irrigation shrinks. Taking the Province as a whole the irrigated area amounts to 30 per cent. of the total cultivated area. Of these 15 per cent. is irrigated from wells, 7 per cent. from canals and 8 per cent. from other sources. Wells are thus the main source of irrigation, supplying about 50 per cent. of the area irrigated, while canals and other sources supply about 20 per cent. each.*

—	1895.	1925.
Total cultivated area	32,600,000	34,900,000
Irrigated area	10,211,828	8,459,000
From canals	1,900,037	1,900,000
From wells	5,293,490	4,252,000

On the whole, we find that while there has been a very large increase in the well irrigated area, the canal irrigated area has not only not increased in the same proportion but has remained as before. It appears that the limit of canal irrigation has been reached. At present over half the irrigated area in this Province is indebted to wells for water, and those parts of the Province which lend themselves readily to well construction are adequately provided. But the occurrence of dry seasons, as we have noticed, further stimulates well construction, a favourable reason leading to a relaxing of effort. In 1911-12 there was drought in the Provinces in the early months of the *kharif* and the agricultural situation became full of anxiety. But as the season was on, conditions improved and the *rabi* crop was a great success. The short rainfall in the *kharif* season led to an increase of the irrigated area of that crop by 32 per cent. In 1924-25, the winter rains were deficient in the Provinces. This led to a resort to irrigation in a larger measure. The net irrigated area went up from 79.46 lakhs of acres in 1923-24 to 84.59 lakhs or 6.5 per cent. The area which received water from the canals rose from 16.35 lakhs to 19.00 lakhs of acres, the area irrigated from wells from 42.52 to 43.09 lakhs, and that from ponds and other sources from 20.58 to 22.50 lakhs. The increases were 16.2, 1.3 and 9.3 per cent. respectively. The number of masonry wells rose from 742,421 to 748,781, while that of non-masonry wells diminished from 636,765 to 596,393. As ponds and *jhils* had sufficient water owing to excessive rains, there was

* Season and Crop Reports of the United Provinces, 1911-12 and 1916-17.

less need of sinking earthen wells. During the famine of 1907-08 the area irrigated from wells increased to three times that which was irrigated from canals. The canals are mainly supplied from the rivers arising in the hills. Of these the Jumna and Ganges canals already use the total supply of these rivers while the Sarda Canal is now under construction. In the south the streams arising in Central India irrigate an area of about 1.75 lakhs of acres. The perennial rivers have thus been or will shortly be put to their fullest use and any large extension in this direction cannot be looked for.*

It thus appears that there is an increasing dependence of agriculture, with the continuous multiplication of population not upon the rivers but upon the subsoil reservoirs, the engineers having already almost exhausted the supply of water available in the rivers which serve the United Provinces. An additional drain necessary for the annual well irrigation of two million acres implies that there must be less steep gradient in the subsoil water now than thirty years ago, and that there is a permanent tendency towards a fall in the subsoil water-level. The only possible method of checking the fall in the subsoil water-level is to save as much as possible of the rain water or canal water which at present runs off into the rivers. Molony suggests the following measures as possible remedies: (1) It might be arranged that at times when there was not a full demand for irrigation water the canals should utilise their surplus in filling tanks instead of running it to waste. Irrigation done from tanks so filled might possibly be charged at a lower rate so as to encourage villagers to get their tanks filled up. (2) In undulating country, an extension of the existing practice of constructing field or ravine embankments might do much to save water. (3) Attempts might also be made to get a more direct and rapid flow of surface water into the subsoil by excavating swamps or wells in the beds of tanks or streams thereby making a direct communication between the surface water and the sand beds in the subsoil. It is not impossible that drainage into the subsoil would be found to possess nearly all the advantages of surface drainage without its great drawbacks. (4) There remains, lastly, the keeping of all land under the plough. This would probably be the most efficacious method of all but the cost would, of course, be immense.

A great saving in water might be effected by piping or lining the water-channels. At present there is great loss of water due to evaporation and percolation in earthen channels. In many villages channels lined with roof tiles may occasionally be seen, especially where the water is to be conducted to long distances and along more porous soils. The fall in the water level reacts very unfavourably upon irrigation. In many tracts a considerable fall has rendered useless a large number of existing masonry wells. It has greatly increased the cost of constructing new wells as well as of the labour and cost of lifting the water to the surface. The use of mechanical power to pump water from the subsoil is thus one of the most urgent measures for agricultural improvement. There is no doubt that the slow but steady fall in the subsoil water level noticed in some parts of the United Provinces will inevitably lead to the adoption of power pumping for irrigation on which the whole future of irrigation depends.

The following figures for the years 1911 to 1925 illustrate not only the remarkable dependence of agriculture on well irrigation in the non-caanal districts of the United Provinces but also the extreme limit which well-irrigation has reached in spite of a lowering of the water-level and other difficulties.

* Leake: "Trend of Agricultural Development in the United Provinces," *Agricultural Journal of India*, 1923, p. 13.

Progress of irrigation in the non-canal districts.

District.	Year.	Total net cropped area.	Estimated irrigable area.	Well irrigated.	Irrigated from other sources.	Total irrigated.	Per cent. irrigated to estimated
Budaun ...	1911-12	970,151	272,000	60,535	27,105	87,640	32·2
	1916-17	995,334	295,000	131,997	66,469	198,456	66·1
	1924-25	878,927	305,000	24,566	—	24,566	8·2
Moradabad...	1911-12	1,084,035	217,000	36,898	4,146	41,044	18·9
	1916-17	1,115,912	221,000	89,214	46,472	135,686	62·9
	1924-25	1,041,076	227,000	35,827	{ 2,493 1,459 Canals	{ 38,320 1,459	{ 16·7
Shahjahanpur	1911-12	779,097	254,000	87,132	48,368	135,500	53·1
	1916-17	799,720	256,000	155,369	87,964	243,333	95·0
	1924-25	737,453	260,000	33,201	16,414	49,615	19·3
Benares ...	1911-12	471,317	185,000	108,001	25,322	133,323	91·9
	1916-17	483,185	195,000	148,371	37,824	186,195	95·3
	1924-25	474,643	207,000	131,038	10,229	141,267	68·0
Mirzapur ...	1911-12	711,602	110,000	31,654	{ 21,677 40,500 23,340	{ 53,331 40,500 58,227	{ 85·4
	1916-17	766,714	219,000	34,887	{ 53,946 Reservoirs 11,005 Canals 9,750	{ — 64,951 35,597	{ 56·1
	1924-25	663,620	175,000	25,847	{ 52,611 18,296	{ — 70,907	{ 65·7
Jaunpur ...	1911-12	628,291	417,000	184,014	53,335	237,349	56·7
	1916-17	652,748	442,000	293,410	72,404	365,814	82·8
	1924-25	648,744	476,000	295,149	43,612	338,761	71·2
Ghazipur ...	1911-12	601,419	253,000	124,817	61,338	186,155	73·5
	1916-17	618,885	263,000	154,959	73,008	227,967	86·7
	1924-25	612,646	273,000	142,439	43,834	186,273	68·0
Ballia ...	1911-12	529,893	232,000	130,484	51,401	181,885	78·4
	1916-17	538,406	249,000	147,572	56,219	203,791	81·9
	1924-25	541,029	268,000	136,164	49,344	185,508	69·0
Gorakhpur ...	1911-12	2,123,966	803,000	255,776	297,247	553,023	68·8
	1916-17	2,124,909	831,000	399,319	310,909	710,228	85·4
	1924-25	2,129,881	939,000	414,371	373,855	788,226	83·9
Basti ...	1911-12	1,269,856	711,000	119,219	228,513	347,732	48·9
	1916-17	1,271,325	730,000	306,230	270,063	576,293	78·9
	1924-25	1,311,357	770,000	211,748	397,168	608,918	79·0
Azamgarh ...	1911-12	857,466	528,000	183,479	195,991	379,470	71·8
	1916-17	901,125	559,000	261,628	243,253	504,881	93·9
	1924-25	902,172	601,000	276,104	204,310	480,414	79·8
Bahraich ...	1911-12	976,138	91,000	9,159	40,201	49,360	54·2
	1916-17	996,907	100,000	27,699	63,106	90,805	90·8
	1924-25	955,580	102,000	11,811	50,384	62,195	60·9
Gonda ...	1911-12	1,156,553	341,000	61,727	50,869	112,596	33·0
	1916-17	1,181,004	366,000	197,575	132,150	329,725	90·0
	1924-25	1,157,952	389,000	161,044	128,589	289,633	74·5

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A scrutiny of the above figures goes to show that the percentage of irrigated to estimated irrigable area in most of the non-canal districts of the United Provinces has reached a very high figure varying from 65 to 95 per cent. It is clear that the limits of well irrigation have been nearly reached under the existing technique and hand and bullock power used by the people. The slightly smaller percentage of the irrigated area in the sub-montane tracts is due to a greater dependence on water from rivers and streams. The *khadir* of the Ganges and of the other rivers does not ordinarily require irrigation. In dry seasons the streams are used if they contain water and temporary wells can be made, while a supply of water may be obtained also from old river channels and *jhils*. Irrigation water is also obtained by damming the streams at the end of the rains; the water being conducted through an indigenous system of *nullahs*. In some parts, however, the soil lies low and consists of very hard and stiff clay. Wells cannot, as a rule, be sunk here in the clay where they are most needed, and a supply in them is often very inadequate.

Wells are and will remain the major source of irrigation throughout the Gangetic alluvium and the Doab. Yet many districts show a shrinkage under well irrigation. South of the Jumna, the ground water supply is becoming more and more precarious, leading to an agricultural crisis. Other sources of supply are the *jhils* and tanks. These are chiefly used in the east of the Province, in which some 15 lakhs of the 22 lakhs so irrigated occur. With the gradual increase of pressure of population particularly manifest in the eastern districts, the fields encroach upon the marshes and swamps, while drainage schemes are also being undertaken. This has led in the first place to a diminution of the so-called "other sources of irrigation," and, secondly, to a lowering of the subsoil water level which renders well irrigation and agriculture more difficult. Molony observes:—"There is no doubt that to drain a swamp pleases the people of the locality, and it renders good land available for agriculture; but the hidden results to the agriculture dependent on the swamp for a considerable portion of its subsoil water-supply far exceed the advantages obtained by the drainage operations." The former bad state of the tract of country in the Aligarh and Muttra districts now served by the Mat Branch canal is an object lesson of the great damage that may be caused by allowing the subsoil water level to sink excessively. Had it not been possible to bring canal water to that tract, a great deal of good land served by wells would have relapsed into poor dry land with no source of irrigation.* In Muttra district the alarming fall of the water-level in the wells has been checked by the canal system, which has relieved a situation which was gradually becoming critical. In Mahaban tahsil the average water-level had receded from some 45 feet in 1877 to about 65 feet when the Mat Branch extension was opened in 1904. The level was reaching a point where the cost of masonry wells was becoming prohibitive and the digging of earthen ones impossible. The introduction of the canal into this tract has raised the average depth of the water in the wells to its old level of approximately 45 feet and averted the agricultural disaster which a further fall would have entailed.† Muttra has lost in numbers considerably within the last three decades.

The effects of the pressure of population are seen in the progress of irrigation, particularly in those districts where the normal rainfall is relatively low. On the whole, however, the percentages of net cultivated area irrigated from various sources are higher in those districts where irrigation is relatively easy on account of the high water level, and the occurrence of marshes and *jhils*. The difficulties of well construction as well as the limits of canal irrigation manifest themselves in districts of deficient and

* Molony: "Note on the level of the water in the subsoil of Gangetic plain," 1915.

† Lane: *Final Settlement Report of the Muttra District, 1921-1925.*

precarious rainfall in a disparity between the figures of the percentage of irrigated to irrigable area and of multi-cropped area and density. This is true both of well irrigated and canal irrigated districts as will appear from the following table:—

Name of district (arranged according to order of density).	Density of population per square mile.	Rural Districts.	Normal rainfall.	Percentage of irrigated to irrigable area.	Percentage of area cropped more than once to total cultivated area.	Percentage of irrigated area cropped more than once to total area cropped more than once.
Benares ...	898	704	39·99	68·2	22·8	1·3
Jaunpur ...	745	711	40·62	71·2	25·6	2·4
Gorakhpur ...	721	690	48·15	83·9	32·8	·96
Azamgarh ...	690	—	40·42	79·9	26·2	3·2
Basti ...	687	—	47·67	71·8	37·3	·29
Ballia ...	679	—	41·45	65·6	24·6	1·4
Meerut ...	652	545	28·09	36·8	33·4	1·3
Ghazipur ...	597	—	39·53	68·2	—	2·1
Partabgarh ...	592	—	37·90	53·7	28·0	6·1
Bulandshahr ...	560	—	26·00	49·8	31·7	15·2
Aligarh ...	545	455	25·00	60·2	21·5	24·2
Gonda ...	524	—	44·55	74·4	43·6	·43
Farrukhabad ...	509	451	30·89	46·7	18·4	15·1
Cawnpore ...	485	392	31·85	44·7	9·4	16·1
Budaun... ..	484	433	32·91	10·3	20·2	·98
Hardoi ...	465	—	34·38	14·2	17·1	1·18
Unao ...	458	—	33·41	44·0	18·7	2·1
Mainpuri ...	446	—	29·70	55·9	15·6	21·1
Muttra ...	427	350	23·61	40·3	12·5	6·2

The above table is thus most interesting as showing the factors of agricultural productivity in relation to the density of population in different districts in the United Provinces. The amount of normal rainfall as well as facilities of irrigation show their effects on double cropping district by district. Gorakhpur has increased in density from 707 to 721. Such high density is correlated with an abundant rainfall and high percentages of irrigated and multiple cropped areas. Basti, which shows the next highest density, has also a heavy rainfall. While in Gorakhpur the average over 28 years is nearly 54 inches being still higher in the South, in Basti it varies from 40 inches on the Gogra to 70 on the frontier. The seasonal distribution varies little over the whole tract. Rainfall is seldom absent from more than one of the first four months of the year, and there is almost universal rain in May. In a good year the *hathiva* rainfall is also abundant, but this is uncertain. Thus the *rabi* is secure and easy to raise while the autumn harvest is largely a gamble. In the west, the districts of Saharanpur, Muzaffarnagar, Meerut and Bulandshahr are artificially protected by the upper and more reliable portions of the Ganges and Jumna canals, and their density of population is high and is increasing. Of these, Meerut and Bulandshahr show nearly one-third of their total cultivated area cropped more than once. Both irrigation and rainfall together govern the area cropped more than once. There also appears a close correspondence between the percentage of area cropped more than once with the

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density of population. Such correspondence between high density and increase of cultivated area and multiple cropping can also be shown by taking the natural regions. The following table indicates that the figures of the percentage of cultivated to total area and of double cropped area correspond very closely to the order of density of the different divisions in the United Provinces:—

Natural Divisions.	Density.		Gross cultivated to cultivable area.		Percentage.	
	1911.	1921.	1909-10.	1919-20.	Irrigated to cultivated area.	Double-cropped to cultivable area.
Indo-Gangetic Plain East.	706	711	107·2	111·0	44·7	20·5 (18·4)
Sub-Himalaya East ...	586	605	118·2	122·0	28·7	29·3 (26·1)
Indo-Gangetic Plain Central.	538	528	105·5	109·0	32·1	17·7 (15·1)
Indo-Gangetic Plain West.	550	508	103·9	103·7	30·2	14·7 (13·2)
Sub-Himalaya West...	437	399	101·4	98·7	14·8	17·9 (15·4)
Central India Plateau	211	198	77·9	83·3	6·3	4·5 (23·4)

It appears from these figures that in the decade of 1911-21 there has been an increase of density as well as of the percentage of gross cultivated (i.e., the double cropped added to the net cultivated) to the cultivated area in the Eastern Sub-Himalaya and Eastern Indo-Gangetic Plain divisions, which already are the most congested. High and increasing density co-exists with great and increasing intensification of agriculture in tracts which now maintain more than double the number of persons per square mile maintained in agricultural Europe. The only exception appears to be Gonda district. Here the population fell substantially between 1891 and 1901, and there has been very slight recovery during the past two decades. The statistics also indicate that where the rainfall is defective an increased irrigation has not improved the percentage of multi-cropped area. As we have already seen, well irrigation has almost reached the limit south of the Jumna, while the Irrigation Engineers have nearly exhausted the supply of water available from perennial rivers. The high percentage of irrigated to irrigable area in Muttra and Mainpuri could have but little effect on multiple cropping and density. The same is the case in such canal districts as Aligarh, Farrukhabad and Cawnpore. Here rainfall is less, but the percentages of irrigated to irrigable area are very high. Yet the total area cropped more than once and density are relatively low. In such tracts, with an increase of population we are face to face with the operation in a large scale with the law of diminishing returns to agriculture. Some of these, moreover, have a falling water-level. The pressure of population on the soil cannot be relieved unless and until there are a rapid improvement in the arts of agriculture, a great saving in canal water by high farming and a large reduction of the labour and cost of lifting water by the adoption of power pumping for irrigation.

Let us survey the correlation between water-supply and density in greater detail. In districts where the normal rainfall falls below 30 inches per annum the deficiency outweighs all other factors in limiting agricultural productivity and density of population.

I.

Districts with less than 25 per cent. irrigated area.	Density.	Irrigation.	Rainfall.
Banda	206	5·4	37·95
Bijnor	395	6·9	43·91
Moradabad	524	7·1	38·00
Hamirpur	192	7·5	35·81
Babraich	402	7·1	43·62
Kheri	306	10·0	43·19
Budaun... ..	484	10·1	32·80
Jhansi	166	10·2	34·30
Jalaun	261	12·9	39·00
Sitapur	484	13·6	37·58
Bareilly	642·1	15·6	44·91
Mirzapur	165·8	16·0	42·55
Saharanpur	439·5	18·0	37·57
Pilibhit... ..	319·7	19·9	49·09
Gonda	524·4	20·2	45·26
Allahabad	491·4	20·7	37·28
Hardoi	465·0	21·1	34·66
Shahjahanpur	486·2	23·6	37·47
Bara Banki	585·5	24·2	39·00

(N.B.—Reverse the order according to the amount of rainfall).

II.

Rainfall over 40 inches.	Density.	Irrigation.	Rainfall.
Gorakhpur	721	28·0	48·30
Basti	687	35·1	47·99
Gonda	524	20·2	45·26
Babraich	402	7·1	43·62
Ballia	679	28·3	41·18
Azamgarh	690	45·0	41·12
Mirzapur	165	16·0	42·55
Jaunpur	745	45·5	41·80
Sultanpur	586	35·2	41·31
Fyzabad	676	40·6	40·06
Bareilly	642	15·6	44·91
Bijnor... ..	395	6·9	43·91
Benares	898	31·1	39·60

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III.

Districts with more than 40 per cent. of gross cultivated area which is irrigated.	Percentage of gross cultivated area which is irrigated.	Rainfall.	Density.
Mainpuri	50·6	29·84	446
Aligarh	48·1	25·08	545
Meirut	47·7	28·12	652
Muzaffarnagar	47·2	30·10	479
Jaunpur	45·5	41·08	745
Bulandshahr	45·4	25·86	560
Azamgarh	45·0	41·12	690
Etah	41·5	27·49	482
Etawah	41·3	30·82	433
Fyzabad	40·6	40·06	676

The above three tables tend to show that in districts where only one-fourth of the area is irrigated, irrigation ceases to be a factor at all in determining agricultural productivity and rural density. Irrigation, even above the limit of 40 per cent. of the gross cultivated area, fails to produce its effects upon density unless the rainfall exceeds more than 30 inches, Mainpuri, Aligarh and Bulandshahr with nearly half the cropped area irrigated have relatively low density. Their average rainfall falls below 30 inches. On the other hand, the mere amount of average rainfall exceeding a limit of 40 inches, without the aid of irrigation, fails to contribute to high density. Bijnor and Bahraich, with similar rainfall and similar irrigation development, have nearly equal density. On the other hand, districts like Benares, Ballia and Azamgarh, with less rainfall but with more irrigation, represent a much higher standard of farming and agricultural outturn and possess much greater density.

In districts where the rainfall exceeds 40 inches, rice is the dominant crop. The preponderance of rice cultivation in these districts again varies directly with the relative progress of irrigation, which is remarkable in these tracts. These districts show 70 to 80 per cent. of irrigated land to the irrigated area available. This will be evident from the following two tables:—

Percentages of rice crop to total net-cropped area.

	1907-08.	1909-10.	1911-12.	1913-14.	1917-18.	1919-20.	1924-25.	Percentage of gross cultivated area.	Percentage increase of total net-cropped area between 1907-1924.	Per cent. irrigated to estimated irrigable area.
akhpur ...	48·2	42·5	44·2	46·5	42·2	45·4	46·1	28·0	2·5	83·9
ti...	52·7	47·2	48·7	48·3	50·9	48·7	53·6	35·0	7·6	79·0
raich ...	32·4	23·7	26·2	28·8	37·5	30·3	39·4	7·1	6·5	60·9
ida ...	46·3	35·2	38·4	39·3	46·6	37·2	46·6	20·2	9·4	74·4
area ...	29·1	24·7	23·8	25·6	28·3	28·9	28·3	31·1	5·9	68·0
npur ...	26·4	21·9	20·6	22·9	26·2	23·3	25·3	45·5	5·6	71·2
ngarh ...	38·3	31·3	33·6	37·6	42·1	38·1	40·7	45·0	6·3	79·8

Percentages of wheat to total net-cropped area.

—	1907-08.	1909-10.	1911-12.	1913-14.	1917-18.	1919-20.	1924-25.
Gorakhpur ...	10.9	14.6	14.5	15.8	14.8	15.1	17.2
Basti ...	15.3	21.8	19.4	23.1	20.3	22.2	22.2
Bahraich ...	14.6	19.1	26.1	24.7	24.5	25.3	25.5
Gonda ...	14.9	22.6	24.2	26.1	15.0	26.6	24.7
Benares ...	4.4	7.7	8.7	8.1	7.2	7.8	7.7
Jaunpur ...	4.9	8.1	9.9	8.8	7.2	8.6	7.7
Azamgarh ...	3.4	6.1	6.6	7.4	5.8	7.3	6.3

In spite, however, of the marvellous progress of irrigation, the fluctuations of the rainfall lead to great shrinkages of the *kharif* area throughout the Province, and are fraught with dangers particularly in the sub-montane tracts. In the eastern districts where the *rabi* crop is equally unimportant, the rainfall is less uncertain and the protection by irrigation more adequate.

In the above districts the *kharif* area is much greater than the *rabi* area, and consists of rice. Losses are relatively severe whenever the rain is insufficient or unevenly distributed, and as a rule failure of the rice cannot be compensated by a larger *rabi*, as the land cannot be tilled. In most parts of this tract early rice predominates, but in portions of Basti and Gorakhpur, where the landholders have constructed private canals, later and more valuable rices are largely grown to the general advantage of the people.

The following statement exhibits the net results of the different sowing seasons from 1908-09 following the famine year 1907-08 onwards, the normal area being taken in each case as 100:—

—	1908-09.	1909-10.	1910-11.	1911-12.	1912-13.	1913-14.	1914-15.	1915-16.	1916-17.	1917-18.	1918-19.	1919-20.	1920-21.	1921-22.	1922-23.
Kharif ...	104	101	98	80	98	95	101	102	103	100	94	101	97	99	93
Rabi ...	85	97	108	120	104	82	100	105	109	113	71	94	83	98	106
Zaid ...	121	106	104	107	110	139	172	126	129	97	141	107	117	105	102
Twice-cropped area.	74	87	105	108	91	73	98	109	116	121	64	88	68	92	95

It will be evident that out of 17 years the normal *kharif* area could not be sown for 10 years. In 1924-25 it fell short of the normal by 24 lakhs of acres or 10.5 per cent., and was the lowest during the last 12 years. In 1911-12 there was long continued drought in July and August which led to the decrease in the *kharif* area in all divisions of the Province except Gorakhpur, which had enjoyed sufficient rain for the *kharif*. The decrease was largest in the Agra division, as at present constituted, and in Bundelkhand; it was smallest in the Benares division, and in Oudh, where the sub-montane districts generally received a larger amount of rain. But the short *kharif* was compensated by an excess *rabi* area in all except a few sub-montane districts. Most of the existing canals are meant for the protection of the *rabi* crop. The protection of the rice areas, especially in the eastern districts will be subserved to some extent by the projected Sarda Canal. The scope of well irrigation, however, is almost reaching a limit in some of the rice districts where, as we have seen, the percentage of irrigated to estimated irrigable area is considerably above 70. Between 1900 and 1925 the number of masonry wells in the whole Province has gone

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up from 309,740 to 742,043 or 140 per cent. The Gorakhpur and Basti districts built 1,527 and 1,048 wells respectively during 1924-25. The agricultural security of the above districts will be measured by comparing the relative increase of the percentages of *kharif* areas with the percentages of increase of irrigated areas.

Districts.	Year.	Per-centage of <i>kharif</i>	Per-centage of rice	Percentage of the irrigated to the estimated irrigable area.	Percentage of the irrigated area to the total net-cropped area.
		to total net-cropped area			
Gorakhpur ...	1911-12	73·7	44	68	26
	1924-25	69·5	46	83	37
Basti ...	1911-12	73·7	48	48	27·4
	1924-25	70·7	53	79	46·5
Bahraich ...	1911-12	68·6	26·2	54·2	5·5
	1924-25	72·7	39·4	60·9	6·5
Gonda ...	1911-12	73·1	38·4	33	9·7
	1924-25	74·7	46·6	74·4	25·0
Azamgarh ...	1911-12	63·5	33·6	71·8	44·2
	1924-25	64·6	40·0	79·8	53·2
Jaunpur ...	1911-12	65·5	20·6	56·7	37·7
	1924-25	67·1	25·3	71·25	52·2
Benares ...	1911-12	59·5	23·8	91·9	28·2
	1924-25	63·0	28·3	88	29·8

All the districts north of the Ghagra are naturally protected by a heavy rainfall as well as irrigation, the high water level being responsible for facilities as regards irrigation from wells. Such security may be compared with that enjoyed by the canal districts such as Saharanpur, Muzaffarnagar, Meerut and Bulandshahr. The population of these districts has multiplied enormously within the last three decades while their agriculture is sufficiently protected by the upper and more reliable portions of the Ganges and Jumna canals.

Districts.	Year.	Net-cropped area.	Rabi area.	Percentage of rabi area to net-cropped area.	Wheat area.	Percentage of wheat area to net-cropped area.	Estimated irrigable area.	Total area irrigated.	Percentage of irrigated to estimated irrigable area.	Percentage of irrigated to total net-cropped.
Saharanpur ...	1911-12	835,067	694,123	83·1	6,803	·8	252,000	92,159	36·5	11·3
	1924-25	822,835	607,343	73·8	348,483	42·3	263,000	130,703	49·7	15·8
Muzaffarnagar	1911-12	715,884	564,921	78·0	86,813	12·1	381,000	222,934	58·5	31·1
	1924-25	724,810	529,716	72·9	284,139	39·2	393,000	255,983	65·1	35·3
Meerut ...	1911-12	1,111,654	911,276	81·9	37,790	12·3	660,000	404,231	61·2	36·3
	1924-25	1,097,894	801,397	72·9	396,593	36·1	695,000	372,079	53·6	33·9
Bulandshahr	1911-12	893,852	730,038	81·7	122,916	13·7	569,000	390,660	68·6	43·7
	1924-25	885,150	621,867	70·2	220,434	24·9	575,000	286,787	49·8	32·4

It is significant that in many of the non-canal districts the percentages of irrigated to total net-cropped area are very much greater than those in the canal districts. The increase of irrigation facilities also is as a rule much greater in the non-canal districts. But the small irrigation development of some of the sub-montane districts coupled with the increasing dominance of the rice crop is a cause of anxiety in spite of higher rainfall and the *terai* conditions. Embankments to benefit the late rice should be built and the streams utilised wherever possible. In some tracts pumps on the rivers might be useful for irrigation.

The districts of Azamgarh, Jaunpur, Gorakhpur and Basti show a much larger irrigated area than the canal districts. Large areas irrigated in these districts depend upon the minor rivers as well as *jhils* and *tals* which are a fairly safe source being filled by the inflow of the rivers. These rivers offer more or less adequate protection to rice. The masonry and temporary wells with which these districts are honeycombed protect the *rabi*. These are the more important sources of irrigation and in some tracts the only source. Conditions are also exceptionally favourable for sinking masonry wells as water is near the surface and foundation clay found in most tracts.

The agricultural superiority of the non-canal to the canal districts will be evident from the following table:—

	Percentage to cultivable area of		Normal rainfall.	Percentage of increase of density of population, 1872-1921.	Percentage of increase of total net-cropped area, 1891-1924.
	Net-cultivated area.	Double-cropped area.			
<i>Non-canal districts.</i>					
Benares	82·6	22·4	39·99	15·0	14·3
Azamgarh	77·3	20·1	40·42	14·8	10·2
Jaunpur	76·0	21·1	40·62	12·6	2·4
Gorakhpur	82·7	22·7	48·15	63·2	4·4
Basti	80·3	26·8	46·67	30·7	4·9
<i>Canal districts.</i>					
Meerut	82·4	18·8	28·09	17·5	1·6
Saharanpur	80·8	19·7	30·99	6·1	— 2·0
Muzaffarnagar	75·5	8·9	29·67	15·2	5·5
Bulandshahr	80·8	24·7	26·0	13·8	4·1

The non-canal districts mentioned above show higher percentages of net-cultivated as well as double-cropped area to total cultivable area. The former, it is true, have a more abundant and less uncertain rainfall than the western districts. But to the natural advantages of rainfall have been added the results of strenuous human effort in the direction of private irrigation from wells, *jhils*, *tals* and from the minor streams. We have already seen that the percentage of irrigated area in Azamgarh, Jaunpur or Basti is more than one and a half times those in districts where canal irrigation by Government has been introduced.

On the whole we expect a relatively greater agricultural progress and increase of population in the former districts than in the latter. This will be the case as a result of the efforts in the following directions:—

- (1) The gradual completion of the equipment of these districts with cheap masonry wells which already exist in very large numbers and whose construction is proceeding rapidly everywhere. This will be

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facilitated by *faccavi* loans as well as by the extension of co-operative organisation. Regular well surveys should be undertaken and a boring staff be maintained in each district to locate sites in doubtful localities and to pierce the foundation clay where it is too thick for country tools.

(2) The development of co-operative effort for the construction of dams, embankments and drainage works. At present the periodical floods work great havoc and their prevention must now be a matter of serious concern. Rivers, minor streams as well as drainage lines should be investigated and land reclamation and construction works under the guidance of Agricultural Engineers ought to begin on a systematic scale.

All this coupled with the natural advantage of a more abundant and even rainfall will inevitably bring about a relatively greater productivity of land and density of rural population than are expected from the development of the canal-irrigated districts.

The agricultural progress of the canal-irrigated districts lies in the following directions:—

(i) Though the canal system is extensive, there are few districts where canal exceeds well-irrigation. Moreover the canal seldom enables a full *rabi* area to be sown in years of drought when the additional water required has to come mainly from the wells. Thus there is considerable scope for assisting the construction of additional masonry and temporary wells.

(ii) Various canal tracts suffer from defective drainage and over-saturation. In some agricultural depression follows the spread of *reh* in the areas adjoining the main branches; while in others a rise in the water level occasions the falling in of non-masonry wells. The improvement of the natural channels of the minor streams and the opening out of arterial drainage lines must be undertaken on a systematic scale so that the danger to agriculture from water-logging and salt-encrustation is mitigated.

(iii) There is no doubt that over-irrigation in many regions leads not only to the waste of a vast volume of water but also to poor cultivation, and sometimes to the extension of useless alkali land which necessitates an expensive drainage system for its reclamation. The water demands of the various crops require closer investigation, and the possibilities of water saving by a combination of fodder production and improved methods of agriculture should be explored in irrigated regions. The Japanese system of adjusting the quantity of water-supply to crops and field conditions by the provision of irrigation canals with gauges for the proportional distribution of the water and the construction of discharge canals may be adopted.

(iv) As the rainfall seems to be the ultimate limiting factor in agricultural progress, a more systematic policy of afforestation and of suitable crop production in sandy tracts to prevent a further increase of arid conditions must be followed. The introduction of defensive vegetation against sand will contribute to the reclamation of new land or to the increased fertility of old. In many districts in the south-west the sandy plains are making considerable advances so that the Indian desert is extending towards the north-east. The loose sands set free by the disappearance of scrub jungle and grass with which bound them together now have resumed their march under the action of the westerly wind and already have extended a considerable distance in many districts of the United Provinces. Nothing but a chain of forest reserves can hinder further progress. Deforestation has reached the point of destroying the equilibrium between the factors determining the climate and hydrographical conditions of the tract thus imperilling its agricultural future.

QUESTION 18.—AGRICULTURAL LABOUR.—Classes of populations and their economic conditions.—The decline of peasant proprietorship, the prevalence of land-lordism and the growth of the landless class upon the land have profoundly affected the distribution of wealth in India. The control of land in an old agricultural country like India has largely shaped her social and political organisation. Thus the recent changes in ownership and tenancy imperceptibly modify the whole fabric of social life. The economic distribution of wealth is judged from the broad division of population into agricultural, industrial, economical, professional and other classes. A closer examination would require in the first place the differentiation of industrial workers from agricultural labourers (farm hands, etc.), and general low grade labourers of the miscellaneous and casual type who are on the margin of work and life, and secondly, the isolation of the fixed wage-earners from the rest. It is on the landless classes that the vicissitudes of the times deal their hardest blows. The following figures from one of the famine-ridden districts of the Central Provinces will tell their own tale. The figures for the labouring castes in Saugor district in successive years were as follows:—

1891	...	...	...	...	...	...	...	145,420
1901	...	...	...	...	...	...	...	109,225
1911	...	...	...	...	...	...	...	140,149

There was a fall of 25 per cent. during the famine decade; but in 1911, the aggregate was within 4 per cent. of the figures of 1891. Many who migrated doubtless returned; and with increasing prosperity the birth rate became prolific. Again, famines cut out half a generation, but children born since 1900 reached the working age.

The professions representing more or less the affluent section of the community form a microscopic minority in India. The fixed wage earners also form a very small section. The unskilled labourers are now seen to increase decade after decade. The following table shows their number in 1911 and 1921:—

—	1911.	1921.	Variation per cent.
Farm servants and field labourers.	41,246,335	37,924,917	— 8·1
Labourers and workmen unspecified.	8,273,650	9,300,105	+ 12·4

Part-time hired labour.—Hired labourers in India, unlike those on the farms of North and North-West Europe, are not whole-time professional labourers but part-time day-labourers. They usually own a little land themselves, and would like more but there is also a growing class of landless labourers whose employment is uncertain, and who shift from fields to mines and from mines to plantations.

Decline in cultivating landowners and field labourers.—Every circumstance which has weakened the economic position of the small holder has increased the supply of agricultural labourers—the loss of common rights in the rural economy, the disuse of collective enterprise, the sub-division of holdings, the increase of the class of rent receivers, free-mortgaging and transfer of land and the decline of cottage industries. The growth of population in this century has been so great and the holdings have so much been reduced in size that they have often become uneconomical compelling the peasants to supplement the proceeds of their holdings by outside work, or to sell their lands to middle-men or to more prosperous peasants.

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It is noteworthy that the populations on the margin of life engaged in occupations that entail heavy physical but little mental energy are endowed with larger families than the higher and the more intellectual sections of society. In a normal decade with no epidemics or other disturbing factors, such sections of the community may be expected to increase faster than the rest. The last two decades have been unusual, and the mortality which is always the heaviest from these lower orders has been particularly heavy. Mr. S. V. Mukerjee who, in his Census Report, discusses this question shows that the number of field labourers in Baroda has been progressively decreasing since 1901; but on the other hand, the number of cultivators and receivers of rent from agricultural land (with their dependents) has progressively increased (from 970,675 in 1911 to 1,058,182 in 1921). The Punjab Census Report similarly records an increase of the number of persons living on income from rent of agricultural lands from 626,000 in 1911, to 1,008,000 in 1921. On the other hand, the number of farm servants and field labourers has actually decreased from 1,192,000 in 1911, to 1,134,000 in 1921. In Madras there is a similar tendency throughout the last twenty years for cultivating landowners and labourers to lose ground to the cultivating tenant and the non-cultivating rent-receiver or rent payer. For every thousand of workers (i.e., excluding dependents) the non-cultivating classes number 77 in 1921; they numbered 20 in 1901. The agricultural classes are classified as follows in the Madras Presidency.*

	1901.	1911.	1921.
Non-cultivating landowners	19	23	49
Non-cultivating tenants	1	4	28
Cultivating landowners	484	426	381
Cultivating tenants	151	207	225
Farm servants and field labourers ...	345	340	317

"Does this imply," asks the Census Superintendent, "that the man who farms his own lands is being forced to relinquish it to the non-cultivating money-lender from whom he will cultivate as a tenant.?" In the United Provinces, the number of ordinary cultivators has increased from 28,712,015 to 29,843,168. On the other hand, the number of farm servants and field labourers has decreased from 4,562,043 in 1911 to 4,035,887 in 1921, the decrease being 11.3 per cent. In Bihar and Orissa rent payers or ordinary agriculturists have increased by 9 per cent. while farm servants and field labourers have declined by 22 per cent. In Bengal also the number of ordinary cultivators including dependents has increased from 29,748,666 to 30,543,557, and the number of farm servants and field labourers has diminished from 3,660,000 to 1,805,502, the decrease being 50 per cent. In the Central Provinces and Berar ordinary cultivators have decreased by 161,000 or 2 per cent., while rent receivers have increased by 52 per cent. or 67,000 persons. This has been due to the increase of the practice of sub-letting. On the other hand, farm servants have declined by 23 per cent. The following statement of the economic position of the different classes in Balaghat shows the same tendency as prevails in other districts. The number of rent-receivers and cultivators increased from 173,655 to 205,753 in the period 1891 to 1901, but the number of farm-hands actually decreased from 52,264 to 44,802, a reduction by 15 per cent. approximately, while the number of field labourers showed but very slight increase 48,500 to 51,470. Many of the farm hands took to cultivation without altogether giving up their former occupation of working in the mines and irrigation works, or carting mineral and forest produce. It is doubtful

* Pillai: *Economic Conditions in India*, p. 114.

whether this increase in the number of cultivating owners and tenants is an unmixed good. Where the agricultural labourer as a result of the rise in prosperity sets up as a peasant proprietor, we may hope he turns his land and his own life to good account with the magic of property around him. But he is mostly without staying power and his holding is more often than not too small to be economic.

Driving the hired labourer off the land.—By a selective process, the superior cultivator is driving the more thriftless of his brethren to the marginal areas. Thus the extension of cultivation results, if at all, in a gradually diminishing return to an increasing amount of labour and expense. It is noteworthy that the figures of the transfer of land by agriculturists to non-agriculturists show that the tendency of the latter to take possession of the agriculturist's land is to a certain extent increasing synchronously with the tendency to rent the land rather than cultivate through hired labour. In Bengal ordinary cultivators number 9,274,927 workers, and the farm servants and field labourers number 1,805,502. There is thus only one hired labourer on the land to every five who cultivate land of their own. In Dacca and Chittagong Divisions, there is only one hired labourer to eight ordinary cultivators. In the United Provinces there are 16,092,000 cultivators (workers) while the farmers and field labourers total 4,035,887. Here there is only one hired labourer to every four cultivators (workers). In the Central Provinces and Berar, 47 per cent. of the population are cultivators, and 27 per cent. farm servants or labourers, i.e., there is approximately one hired labourer to two cultivators. In England and Wales there are by contrast well over three hired labourers to every farmer. It may be said generally that the holdings in the United Provinces, Bihar and Bengal are so small that the cultivation of them is hardly ever too much for their owners themselves to accomplish unaided. And, in fact, the greater the pressure of the agricultural population on the soil and the more uneconomical in size the holding becomes as a result of minute sub-division, the less will be the tendency to employ hired labourers in the fields, who will have to seek employment in the rural tracts as earth-workers and road menders or migrate to industrial towns and plantations. This explains the large increase of the class of unspecified workmen in the last census decade. The more efficient of them may accordingly be called professional labourers (*majdur*) as distinguished from field labourers. The professional labourers work on roads and railways, in harbours and dock yards; they are employed for canal cutting and building construction, for the lower strata of domestic service and for all the work which demands either a little more intelligence or more strenuous exertion than the work done by a field labourer.

Conditions of the field labourer.—Somewhat superior in economic status are those field labourers who possess small plots of land of their own, or they work as partners, receiving half the crop for cultivating another man's plot, the principal paying the rent and supplying the seed grain. If no seed grain is supplied, half the reaping expenses must be given by the principal if he wants to have a moiety. If neither seed nor reaping expenses are given, the shares are two-fifths to the principal and three-fifths to the cultivator. Sometimes the peasant acquires the right to cultivate another's plot by offering paddy loans, and the shares are governed by local economic conditions. It is because their own holdings do not suffice for their maintenance that they are hired out. Sometimes, again, they do not possess any holdings at all either of their own or on share basis, and are permanently attached to a cultivator's family or move from plot to plot. In the former case, they are furnished with a small wretched cottage in the midst of the farms which they till. The field labourers are often paid in kind for their services. They receive a share in the crop, together with other dues which are fixed by custom. This custom varies from Province to Province. Again, the share of the farm hands differs according to

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harvest conditions. Usually the share of the harvest allotted to the farm hand is standardised by a bundle tied by three lengths of straw. As the straw length increases or decreases with a good or bad harvest, there is an automatic adjustment of wages. When the harvest is abundant, the field labourer enjoys plenty. The Chamars in the United Provinces, who supply agricultural labour and help the cultivators in ploughing, sowing and reaping, and also repairing the cottages, get one-thirteenth part of the produce of barley and one-sixteenth part of wheat. The Ahirs, who sometimes supply agricultural labour, obtain the same remuneration as the Chamars. They are often tied to the same plot of land for generations. In the Punjab, the Chamar, if he is a *separ* (permanent *kamin*) receives one-tenth of the whole crop of grain for the general help rendered by him. The Chamars remove dead cattle, give two pair of boots a year for the ploughman, and two for the woman who brings the bread into the fields, and one ox whip (*narka*), and a leather rope (*santa*) to fix the yoke (*jua*) to the plough in the half-year, and do all the necessary repair. Besides their function as artisans, the Chamars perform a very considerable part of agricultural labour. They clear the fields before ploughing and assist the reaping of the harvest. They also plaster the houses with mud when needed and do all kinds of odd work. The status of the field labourers has been governed by ethnic and social history, the agricultural conditions and population of the village in different Provinces from time immemorial. In Bengal reapers are paid in kind at the rate of their being allowed to take one bundle to every ten bundles they cut. Kind wages for agricultural labourers who are on a yearly contract are 8 to 10 maunds of rice a year, two pairs of cloths and two napkins, together with other small requisites; when new hands are hired they get as much as 5 to 6 annas per diem. In many villages, along with paddy or husked rice, tobacco, *jalpan* (tiffin), oil for bathing and even a meal is given. In the south-western districts the rate is 4 to 5 annas per 15 *gandas* or 16 sheaves; any additional work is paid according to the same proportion. For the pulse and *rabi* crops the rates are less. Sometimes the reapers make a contract of reaping an acre at the rate of so many bundles. Since the price of food grains is rising enormously, the landholder is now substituting payment in cash for payment in grains. This is growing common. The Wage Census of Bengal, 1916, shows that the rates are generally much higher in East and North Bengal than in West Bengal. Taking the wages of unskilled labour as a standard of comparison, we find the highest median rate obtains in Faridpur district (9 annas) and the lowest in Murshidabad district (4½ annas). In the Bombay Presidency real wages are now about 5 seers of *jowar*, while cash wages are 8 or 10 annas a day in the more prosperous districts. In the Western Punjab Rs.5 a month, with a blanket and a pair of shoes at the end of the year, are what a day labourer expects. In the colonies, he gets twice that amount, and food and clothing as well; and if he is sufficiently skilled to work in a garden, he may get as much as Rs.18 or Rs.20 a month. Hours of labour, too, are less exacting, and better work is done in consequence.* Cash wages in the Punjab are 6 and 7 annas a day, and in the United Provinces 4 to 6 annas. In a recent enquiry in the Bombay Presidency, it was found that in 990 villages in which enquiries were made, cash wages without supplement were familiar in 233 villages, and grain wages were familiar in 376 villages. In some of the villages more than one method of payment was in vogue. It is unjust that the landholders should sell away the grains and force these field labourers to purchase the same from the petty shopkeepers at a higher price. The one way of escape for the *padial* from this condition of servitude and poverty is emigration.† But the prospects there are not very attractive. In

* Darling, *The Punjab Peasant*, page 159.

† Slater: *South Indian Villages*.

Ceylon and other plantations the labourers get only 5 annas. A woman labourer in plantations gets only 3 annas.

Wages and the price of rice. It would be interesting to chart the movement of wages (in annas) in the rural areas in Bengal* during the past 80 years:—

—	1842.	1852.	1862.	1872.	1911.	1922.
Field labourer without food.	1	1½	2	3	4	4 to 6
Carpenters	2	3	4	6 to 8	7 to 10½	8 to 12
Ghorami, house makers...	2	3	4	5	6	6
Prices of rice (seers per Re.)	—	—	27·07	22·74	—	5·0

Nominal and real wages.—Economists draw a distinction between nominal and real wages. By nominal or money wages is meant the actual cash which a man earns for a period of time. By real wages is meant the amount of commodities which a man can buy with his money wages. In making comparisons between the economic conditions of different periods, in districts or regions, real wages must be taken. Mr. K. L. Datta, in his *Report on the Enquiry into the Rise of Prices in India*, selected the period from 1890 to 1894 as his basic or standard period for the purpose of estimating the fluctuations in price levels. In reviewing rises in wages in subsequent years, he observes that in rural areas in India, wages of agricultural labourers and village artisans have risen enormously as measured by their purchasing power. About 1912 they were about 38 per cent. above the level of the standard period. The rise in the wages of industrial labour had not been so large. Nominal wages had increased in every case, but the rise was not in all cases as great as the rise in prices. The nominal wages of agricultural labour rose from 105 in 1895 to 189 in 1912; and real wages from 103 to 138 during the same period. It ought to be pointed out here that these wage figures make no allowance of the fact that agricultural labour cannot be continuously employed throughout the year. There are, as we have seen, idle as well as busy agricultural seasons, and wages received during busy seasons do not represent remuneration throughout the year. The following would represent a comparative statement showing nominal and real wages of rural agricultural labourers and labourers in tea gardens in Assam.

The index numbers are given relatives to an index number of 100 for the period from 1890 to 1894:—

—	Nominal Wages.						Real Wages.					
	1890-1894.	1895.	1900.	1905.	1910.	1912.	1895-1899.	1900-1904.	1905-1909.	1910.	1912.	
1. Agricultural labourers.	100	105	125	147	170	189	103	120	123	134	138	
2. Tea Garden labourers.	100	106	103	106	117	120	101	96	90	98	95	

* *Second Wage Census of Bengal*, April, 1911.

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Thus the coolies in tea gardens appear to be in the worst position, as their real wages have fallen 5 per cent. below those in the basic period, though they get some concessions of a limited character, such as land for cultivation and in some cases rice at a lower rate than the market rate.

Rise in wages is less than rise in prices.—The Committee appointed to enquire into labour conditions in Assam found that the percentage of the rise in family earnings in the case of tea-garden labourers for the whole Province in 1922, as compared with 1914, is 19.2. On the other hand, the price of the necessaries of life rose in the same period by 39 per cent. 139.95 represents the approximate difference in the cost of living of the garden coolie in 1922 as compared with 1914.

The items of expenditure of a labourer's family are tabulated in what are family budgets. As a rule, a tea-garden coolie brings his family with him to the garden. In industries like the jute mills and coal mines the labourer frequently leaves his family in his native village and remits money to them, or returns home after some months with his savings. It is estimated that the average coolie family consists of one working woman, about three-tenths of a working child, about one non-working child and two-tenths of an adult non-working dependent. Thus the subsidiary occupations of the man, particularly rice cultivation, and the household duties of the woman are responsible for a considerable percentage of the absentees in the daily muster roll. Adopting the standard of an average working family as consisting of one working man, one working woman and three-tenths of a working child, the rise of earnings has not kept pace with the increase in the family budgets. In other words, the rise in real wages is appreciably less than the rise in nominal wages. The purchasing power of the present level of wages is less than in 1914. The Report of the Board of Revenue of the United Provinces for 1921 states: "The demand for labour was again in excess of the supply, and wages rose in consequence proportionately to the increase in the cost of living, so that labourers did not suffer." The Assam Labour Enquiry Committee remarked: "It can hardly be a matter of surprise if, under these favourable conditions, labourers from the United Provinces should regard the attractions offered on many estates in Assam as insufficient and should hesitate to leave their home districts." In the estates themselves, the coolie's standard of living has been lowered of late years. In the Bombay Presidency, the wages of field labourers in the rural areas have increased in the following manner* :— 1900, 2 annas 6 pies; 1913, 4 annas 3 pies; 1922, 7 annas 3 pies. But real wages have slightly fallen :—

	1900.	1914.	1921.	1922.
Nominal wages	100	180	270	290
Real wages	—	154	138	145

The real wages were based on the prices of six chief important food grains in the Bombay Presidency, year by year, between 1900 and 1922.

Agrarian serfdom in India.—But in the lowest rung of the economic ladder in India stand those permanent agricultural labourers who rarely receive cash and whose conditions vary from absolute to mitigated slavery. Such is the custom of the country in many parts of India that the zamindars, *malguzars*, or ordinary cultivator nearly always contributes to get his servant into his debt, and thus obtain a powerful hold over him

* Report on an Enquiry into Agricultural Wages in the Bombay Presidency, page 23.

which extends even to his posterity. Agrarian serfdom is more discernible in those parts of India where the number of the lower and depressed orders is the largest. Bombay, Madras, Malabar, Cochin, the Central Provinces, Berar and Chota Nagpur show the largest aboriginal population, and it is in these areas that the status of the agricultural labourer verges on slavery. The ethnic composition of the village, which governs the social stratification, is thus responsible for the survival of slavery.

In the Bombay Presidency there are the Dublas and Kolis, who are bound slaves to a greater or smaller extent. Most of their families are serving from several generations practically as slaves to their masters' household. They receive money in advance for their marriage, and orally bind themselves to serve till they pay off their debt. They are fed and clothed by their masters. The first agreement may be for a term of years, but this term usually leads up to another, and that to a third, till in the end all hope of redeeming the advance is gone. Annual farm hands get Rs.200 to Rs.250, and in addition 4 *kuros* of *juar* every month in Amraoti. In Berar such permanent farm hands engaged by the year are called *salkaris* or *baramasis*. Often they have fallen into hereditary dependence on the *malguzar* or cultivator. They are paid 5 to 6 *kuros* per month (1 *kuro* equals approximately 20 lbs.), usually in *juar*, and in addition Rs.25 to Rs.40 in cash and a blanket and a pair of shoes per year. In one district he is paid 2½ *kuros* per week, either in rice or *juar*, and in addition Rs.60 per year and a pair of shoes and cloths. In a village in Berar, I found that there are 100 *salkaris* for 700 families of the village; they get annually Rs.180 to 200. They work for a year, and get an advance of Rs.200 before their engagement.

Padialism, or debt slavery in Madras.—In the south-west of Madras there are the Ezhuvas, the Cherumas, the Pulaiyas and the Holiyas who are virtually slaves. In the east coast the hold on the land of the Brahmins is strongest and a large portion of the agricultural labourers are Pariahs who are often *padials*. The *padial* is a sort of serf, who has fallen into hereditary dependence on a landowner by debt. In almost every case the original debt was a sum of money borrowed by a landless man to solemnize his marriage or, more frequently, that of a son or daughter, the borrower undertaking to work for the lender until the debt should be repaid, in return for a certain limited supply of food. Quite recently a lad of 18 borrowed Rs.25 in cash and grain to celebrate his wedding with due festivity and became a *padial*. Such a loan is never repaid, but descends from one generation to another and the *padials* themselves are transferred with the creditor's land when he sells it or dies. If the *padial* transfers his services to another master, the amount will be returned by the latter. If he runs away, the owner loses the amount. His wages are generally paid in kind. The usual kind wages are 30 Madras measures of paddy per month per head. At present prices 30 Madras measures of paddy are worth about Rs.3-12-0 (5s.). A Madras measure of paddy weighs 2½ lbs. but when husked loses about half its volume and one-third of its weight. The *padial's* paddy allowance therefore works out at about 27 oz. of raw rice per day; a quantity that the man is probably able and willing to eat himself without assistance from his wife and family. But sometimes he gets less. Thus in one village he gets 22 Madras measures of paddy per month, a daily meal of *vagi* porridge, and annually two cloths and 18 measures of paddy or some other grain. In some villages he gets in addition a small plot of land, say, a quarter of an acre to cultivate for himself. The family of the *padial* must help the patron when required, but then extra payment is made. In Bengal the labourer works from 6.30 to 12 a.m. After one and a half hours' recess for food he continues from 1.30 or 2 p.m. till 6.30 p.m. In Orissa he begins work at

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6 a.m. and continues till 11.30 or 12 a.m. Then he goes home for food and rest, returns at 3 p.m. and works till evening. In Orissa hired agricultural labourers, called *muliyas* or *nit majurs*, are of three kinds. (1) The *chakar* or *baramasiya* labourer who is engaged for twelve months. He receives both board and lodging and is paid Rs.24 in two instalments. Usually his ancestor has obtained a loan which descends from generation to generation and from which there is no escape. (2) The *naga muliya* or *haria muliya*, who works under an agreement as a yearly servant like the former but does not receive his board and lodging at his master's house. He receives a *gauni* or 4 seers of paddy and in addition is allowed a plot of land to cultivate free of rent called *betabasi*. (3) The *danda muliya* who enters into a contract with his employer and engages himself for a short period at specified rates of wages. All wealthy Brahmin villages contain a large proportion of *nagi muliyas*. In smaller and poorer villages the *danda* and *uparai muliyas* are more usual. The condition of these labourers is very unsatisfactory. Before the harvest when stocks are low, they seldom get the bare minimum of subsistence while they are a little better off during the harvest season. Similar classes of hired labourers are met with in Midnapore. The *danda muliya* here gets 5 annas per 15 *gandas* of sheaves reaped. He enters into an agreement called *kuta*, to plough or harvest the fields. The *kuthia* is given 18 *gunts* of land. From Chait to Bhadia he gets 15 *kathas* of paddy and from Ashwani to Falgun 6 *kathas*. He also gets one *chaddar* a year.

Kamia System of debt bondage in Bihar.—Worse than all the former classes of serfs are the *kamias* of Bihar, bond servants of their masters, who in return for a loan received likewise bind themselves to perform whatever menial services required of them in lieu of the interest due to the loan. Mr. Sifton in his Hazaribagh Settlement Report describes the *kamiauti* (agricultural slavery) thus: "In the first place the *kamia* cannot bargain about his wages, he must accept the wage that is customary for landlords to give to his class, which is 2½ seers (*katcha*) of unhusked paddy yielding about ¾ seer of rice or its equivalent in some other grain; the wages are invariably paid in grain and not in cash, and represent only one-third of a day's wages for free labour paid for example by a contractor for road repair work. If the *kamia's* wife also works for his master, she receives a slightly smaller remuneration; and their joint wages are not sufficient to feed properly themselves and the normal family of children which they are certain to possess. Secondly, the *kamia* never sees any money, unless it be the occasional few pice he may earn as a *palki* bearer in his spare time, which he naturally spends on drink. Consequently he has no chance of ever repaying the principal of his debt and becoming a free man again. A *kamiauti* bond therefore involves a life sentence. Thirdly, the condition becomes hereditary. Although the son is not responsible for his father's debt after his death, a new debt is always contracted on behalf of the son on the occasion of his marriage which renders him also a *kamia* for life. Fourthly, daily work is not guaranteed by the master, and no food is supplied on the days when there is no work to be done. The result is thus that the master takes the *kamia's* labour at a sweated wage for most of the year, but at a time when there is no agricultural work to be done and the *kamia* has least chance of getting any daily employment elsewhere, he is left to shift for himself as best as he can. He is then free to get work wherever he can, but cannot leave his village for any time in search of it for fear that he might abscond. Actually he is reduced to earning the most miserable subsistence by collecting fuel and grass for sale."

The restriction of his movements renders the *kamia* nothing better than a Negro slave. An absconding *kamia* is unable to find an asylum anywhere

in any part of the area where the system is prevalent. The landlords as a class combine to maintain the system and return to his master any *kamia* taking shelter in their villages; and in the past the police have helped, unofficially, to track down and recover runaways. On his return the *kamia* is bullied and ill-treated and, having no money at all, he is unable to appeal to the courts for redress or protection. The sale and purchase of *kamias* is by no means uncommon in the north-west of the district. The price is the amount of the *kamia's* debt. It is probably understood that a higher price would be an offence under the laws concerning slavery and the transaction is therefore formally represented as the taking over of the debt. Various customs attach to the *kamia's* action of running away in different districts in Behar. In some villages the first ryot who, seeing that he is a runaway, gives him a meal has the right to him. In other cases, he takes an advance from any one who will give it and execute a bond. If the former master finds out where he is, he can come and reclaim him on payment of any advance which the new master may have made. Sometimes the old master sells off the *kamia* on receipt of the advance given to the latter from a new master. The system is to-day very much alive in most districts in Bihar, and still extending in some. Like the *padial* and the *pulaiya* in Madras, and the *chakar* system in Orissa or the *shalakari* in the Central Provinces, the *kamiauti* can be abolished only by special legislation, making it penal to keep a bond slave and extinguishing all his debts. As a temporary measure, when such legislation is enforced, it would be necessary for Government to open out new lands by reclamation and constitute them into small holdings for the discharged serfs, as well as to provide special facilities for emigration to labour districts. In this way, the surplus serf labour would be drafted off; and their former employes be forced either to settle the agricultural labourers on rent in their lands or to pay them a free-labour wage. In the case of the extension of cultivation, the principle that the Government usually follows is to offer the tenancy of land, hitherto uncultivated, in the first instance to the holder of adjoining cultivated land, and if he declines it to other landholder, so that the landless labourers get no chance unless all the peasants refuse it.

In Bengal the hours of work for the field labourers are from 6 a.m. to 1.30 p.m. and, again, from 3.30 to 6 p.m. In Madras field labourers are sometimes required to work with two intervals from 4.30 a.m. to 6 p.m.; but the regular hours of labour are 6 a.m. to 6 p.m. In the Bombay Presidency, men engaged for one year work from 7 a.m. to 6 p.m. Before the War they worked for 12 hours, while 10 years ago they worked from 5 a.m. to 9 p.m., including outdoor work. In the Central Provinces the hours are from 4 to 11 a.m., followed by afternoon work for cattle. In the rains the regular hours are from 7 a.m. to 6 p.m. In most parts of India there is usually a recess of one or two hours in midday for food. Everywhere the hours are adjusted to summer and winter conditions. Sometimes the agricultural labourer is required to work 24 hours a day, including night watch. In Bengal he gets a remuneration of Re.1 per mensem for guarding the crops at night. A field labourer in Salem district gets a maximum pay of Rs.45 a year in advance, and has to work in the field or in the landlord's house the whole day and night.

Vanishing of the field labourer.—On the one hand, the development of industry and commerce has caused a greater demand for labour in every Province, and, on the other, plague, influenza and malaria have reduced the population. In the villages the more substantial cultivators, such as the Jotdars of Bengal, the Patidars in Gujrat, the Lingayats of Bombay and the superior peasant proprietors of the Punjab, now take a less active part in field operations than before and employ farm hands.

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On the other hand, in the case of the less substantial cultivators whose holdings are small, the economic conditions discourage the employment of inefficient semi-slave or hired labour, while the rise of prices increases the cost of maintaining it on the land. Thus, in many Provinces, there is an exodus of agricultural labour from the holdings of cultivating land-owners. In most parts of India there is very little of culturable land left unoccupied, the best cultivators will not usually care for it, and, as each additional area is leased for cultivation, there being less and less demand for agriculturists, more and more of these landless labourers drift in to take it up, others drift to the mines, factories or plantations in the country or go abroad. Long period contracts are thus gradually superseded and the field labourers, instead of serving the same master from generation to generation, prefer to work for daily wages or on the piecework system. Sometimes they receive payment partly in cash and partly in kind. Dues of this sort are elastic, they depend on local conditions and necessities. But the long-time service of the past, which is a kind of semi-slavery, still persists. It is found even in the Bombay Presidency in Khandesh and Gujrat, where the recent industrialisation has contributed more than any other Province to emancipation of farm hands.

Agriculture in transition. Plight of the derelict farm hand.—In some parts of India, however, agricultural labour is starving, and agriculturists feel bitterly their want for the field labour and apprehend a fall in the value of land in consequence of a demand for the same. In the Madras Presidency it is usual to find *padials* bound hand and foot to the *mirasdars* for generations. At the same time the immigration to Burma, Ceylon or the Straits from the East Coast has long been a source of depression of agricultural labour, and the most substantial cultivators complain that the farm hands are now more difficult to secure and work less efficiently, though they draw double the wages. Thus, in the same Province, the agricultural labour conditions are found to be strikingly disparate in different parts and in different seasons.

Conditions of rainfall and irrigation, ploughing and the rotation of crops, as well as the size of the holding of the cultivator's family, govern the demand and supply for rural labour. It is usually in the cultivating and harvesting seasons that the demand for and price of agricultural labour rise. The distinction in the Census Report between undefined and agricultural labourers is thus not a hard-and-fast one, and there is periodical transfer from one group to another.* The mills, shops and houses of the largest cities and the mines and plantations all draw upon the rural population. Where the available labour supply is largely at the disposal of the local mines and factories, the rates of agricultural wages are higher. On the other hand, where the local landlords command the agricultural labour supply, labourers are more difficult to obtain for industrial purposes. The activities of recruiting agents and the hopes they offer and the deception they practise also play not a negligible part in governing the rural exodus. There is no organization on the part of the agricultural workers. There are no agricultural labour unions which might deal with the *sardars* or middlemen collectively, stipulate about wages and the terms of contract, and guide the flow of labour to places where there is greater effective demand. The conservative habits of the population check the mobility of labour. Where there is no desire for a higher standard of living, the rural labourers are satisfied with the old conditions of employment. The cottage and land industries in which such labourers engage themselves throughout the year also tie them to their villages. This applies particularly to the women. Throughout India the women

* Census Report of Bihar and Orissa, 1921.

and children are employed as carriers. If they are working at any distance from their homes, or if they have no homes, they generally come with the male member of the family, but they often come independently when they are working close to their homes and can return for the nights. Their wages are the lowest. In Bihar, and also in Orissa, the daily wage of a man varies from 4 to 8 annas, while that of a woman from 2 to 6 annas, and that of a child from 2 to 5 or 6 annas, according to size and sex. Similarly, in the Madras Presidency the wage of casual agricultural labour varies from 5 to 8 annas a day for a man and that for a woman from 3 to 4 annas only.* Mann estimated that the cost of living of a labourer's family, consisting of himself, his wife and two children, was Rs.34.65 per month. His estimate was based on a study of villages in the Deccan in 1918. On this basis, the wages shown above are absolutely inadequate. The more substantial labourers use their bullocks and carts to ply for hire from the village to the nearest cities during the off season when they are not required for ordinary purposes. Carting on the roads, poultry keeping, rope making, basket work, cocoon rearing are also common by-occupations of the more substantial field labourers, but the large majority of them are extremely poor and miserable. They are clad in rags and found to live in wretched, insufficient cottages along with the livestock of the farm. I have found men, women and children sharing the same thatched hut with buffaloes. A serf the labourer is, and in ninety-nine cases out of a hundred a serf he must remain. With him the temptation of higher wages in another village or the opportunity for a job in a neighbouring rice mill does not count. Plague, malaria and influenza work their havoc on the population, and most on this class. The diminution of supply increases the demand for labour, but his condition remains unaltered. Above all, the precariousness and uncertainty of Indian rainfall, with which economic conditions are so closely and intimately related, are writ large on his forehead, betokening the small comfort of a single meal, thin gruel and loin cloth in a prosperous year, and starvation and death in a year of scarcity. Such is the condition of the hired farm hand in India, who is so often lost sight of—that toiling, unorganised, unstriking but all-important factor in the machinery of Indian rural life.

A supplementary note on the general land situation in India.

As in all agricultural countries, so in India, the land problem is the most significant of national questions. The standard of living of the Indian peasant cannot rise unless a change in the land system supplies the essential economic basis of more efficient peasant-farming. Neither scientific agriculture nor co-operation can make much headway unless we reform the land system, now so serious a drawback to the prosperity of the small farmers. In many parts of India, the peasant is unable under existing land settlement to make his occupation profitable. Indebtedness weighs him down to an extent difficult for him to remedy at prevailing rates of interest with his average-sized holding and his uncertain tenure, while the high figures of transfer of holdings to the non-agricultural classes indicate a difficult situation. The inefficient system of agriculture that prevails, indeed, is connected less with tillage practice than with the forms of tenure now overshadowing the ancient peasant proprietorship which formerly enjoyed the protection of the village communities. Both small ownership and the growth of village communities in India are connected with the dense population and with the practice of rice agriculture, which necessitates the breaking-up of land into small plots surrounded by dykes and channels, and the collective management of irrigation. The break-up of the village communities everywhere has spelled agricultural decline. The disuse of equitable regulations as regards meadows, pasture-grounds, tanks and irrigation channels or the

* Madras Census Report, 1921.

supply of free labour for common agricultural tasks which formerly was facilitated by the communal life lived in the village communities has brought a weakness to the rural economy, which neither new habits inculcated by education nor the measures of Government can cure. But peasant proprietorship has been weakened not merely by the loss of the traditions of social and agricultural co-operation; it also has been working its own decay by minute fragmentation when there exists no check of a collective co-parcenary community. The creation of landed estates in India has led also to the minimum amount of agricultural utilisation, as in England. With the increase of population and the importation of the English notions of property, the landlord has increased his rents more and more, and also imposed various kinds of illegal cesses and dues, without, however, interesting himself in matters of land improvement. Tenancy legislation has been necessary where tenants have been regarded merely as money investments and permanent improvements have been discouraged, but the economic strength of tenants is by no means assured; while in some parts rack-renting and other dangers of sub-infeudation and sub-letting through a chain of inferior proprietors, are realised. The creation of landlordism, both of superior and inferior grades, and the break-up of peasant proprietorship and the village system in India, have been the result of misunderstanding on the part of early British administrators who derived their lessons mainly from the agricultural history of Western Europe. In the East the village communal system was an old and essential adjustment, suitable to the requirements of dense populations in fertile plains. Thus the land and village systems and forms of tenure are far different in India and Europe.

Small holdings and zamindari estates. In tracing the stages of agricultural development, one should sift the factors which govern the evolution of different types of land-holding and village life in India and the medieval West. An earlier clan and tribal organisation here evolves into the village communal system. The bond of union is no longer kinship but the newly-developed emphasis on co-operative methods in irrigation and the social necessities of a compactly congregated population. This differentiates the Indian village community from the Teutonic or the Slavonic institution. The latter smacks too much of its early tribal, communal origins; while the former has differentiated economic structures, classes and castes and exhibits more elaborate customs and usages governing the diverse interests in the soil than could have been evolved by organisations on a mere ethnic basis. These are quite compatible with intensive cultivation and peasant ownership, though the communal element persistently prevailed. In the West agricultural development was possible only when village collectivism, with its communal routine of agriculture, which was far more rigid than in India, was superseded either by the *latifundia* or by unrestricted small-holding. Here the village communities established a balance between individual and collective rights which was conducive to agricultural efficiency in the adaptation to geographical and social conditions. But the economics of conquest has left its deep marks on Indian as well as European rural life. The influence of political authority and conquest in establishing the feudal as distinguished from the autonomous type of village organisation is discernible in both East and West. Thus the growth of manorial estates has been seen both in Europe and in India and deserves a comparative investigation. Small farming declined as the result both of the suppression of village communities and the rise of a class of superior and inferior rent-receivers who neglected their task and delegated the mere function of collecting their share of the produce to agents or contractors. In other countries, similar causes have produced a similar transformation of the relations of the agrarian population, with its reactions upon agriculture.

Position of the Indian peasant—Signs of unrest.—The agricultural population of India now works on very meagre resources, and these resources

are distributed very poorly, from the point of view of the well-being of the peasants themselves. Our examination of the changes in landownership and tenantry during the last fifty years shows that this mal-distribution is growing worse. The economic position of the small-holder has deteriorated, while the contrasts between landlords and expropriated peasants, between the increasing class of rent-receivers and the toiling agricultural serfs, predict a crisis in our agricultural history. The uneconomic holding, the absence of full proprietorship of the cultivators and semi-slave hired labour, are incompatible with efficient intensive cultivation, which is the great advantage of peasant farming, and without which our increasing population must remain contented with a single meal, thin gruel and a loin-cloth. The dim rumblings of peasant class-consciousness already audible in some parts of India, challenge the present agricultural regime. No man should suffer imprisonment with hard labour on one-eighth of an acre of land. No class should be merely "a mud-hill" which a superstructure may rest"; the class which maintains the race should not be singled out to bear its burdens and penalties.

Tenant Law and its abuse.—There cannot be any doubt that with the rise of landlordism the rights of the village communities and peasant proprietors have been suppressed. The aim of tenancy legislation in Bengal, the United and the Central Provinces has been to correct the mistake of such suppression and to re-create proprietorship, albeit in a modified form. Occupancy right has been bestowed, but the classification of tenants into occupancy and non-occupancy nowhere has been a sufficient protection against enhancement of rents or eviction. The great mistake of tenancy reform has been that the right it created depended upon a time-limit and therefore on the forbearance of the superior proprietor to exercise his power of eviction before it matured. Here the right came to be sold and purchased and the superior proprietor, and sometimes the surrendering tenant as well, took advantage of the situation and extorted some profits from the transaction. This is the case still in Bengal, Bihar and the United Provinces, where the increase of population and competition for holdings have aggravated the evil. The system of taking premiums from the tenants has less hold in Bengal and Bihar than in the United Provinces, because of the creation of permanent heritable rights. In Bengal and Bihar the exaction is imposed chiefly on the occasion of transfer, whether legal or fictitious; and non-transferability has left the zamindar everywhere scope for the appropriation of unearned increment in every Province where superior proprietors have been created. But besides this ground, both in the United Provinces at present and in the Central Provinces before the passing of the Tenancy Bill, the existence of a periodical protected tenancy depending upon the consent of the landlord and hence difficult to acquire has been a fertile cause of the levy of exactions in various guises. With regard to privileged tenants, an increase of rent by the landlord is difficult, and subject to legal control; but in the thickly populated areas of Bengal, Bihar, Orissa and the United Provinces the law regarding enhancement is often, if not commonly, evaded. Though an enhancement of rents is not difficult in Bengal, the improvement of the land is difficult. Large portions of land are let out in *patnis* with very little margin of profit for the *patnidars* who therefore are unwilling to spend any capital. A large proportion of ryots has the status of fixed rent and their rents cannot be legally enhanced even if the landlord spends money and effects improvement. The difficulty of obtaining increase of rent from the ryots on the ground of improvement is very great and both superior and inferior proprietors are generally loth to take the uncertain risk of litigation. As regards the ordinary tenants in Bengal, the Agra Province and Oudh, the laws, while preventing sudden rises in rent, do not hinder enhancement and eviction. The custom of sub-letting also has grown, in spite of legal difficulties, in Bengal, Bihar, Agra

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and Oudh. This has converted the tenant into a mere rent-receiver who has taken full advantage of the general rise of prices, and further contributed to reduce the economic status of the actual tillers of the soil. In large parts of Central and Western Bengal, the sturdy class of Bagdis and Bouris has succumbed to the more intelligent castes. They have been reduced to mere labourers, while those who claim the privileges of a ryot of the Bengal Tenancy Act are often people to whom the driving of plough is a social degradation. Evils of this type have not been corrected as yet by recent legislation, such as the Oudh Rent Act. Freedom of sub-letting likewise has converted the occupancy tenant in Bengal and the peasant proprietor in many parts of the Punjab and the Madras Presidency into a rent-receiver, an absentee inferior proprietor living on rent or share of the produce. On the other hand, it is the non-occupancy tenants who not only pay much higher rent than the occupancy tenants, but also rent smaller-sized holdings and, having little security, pay higher rates of interest for agricultural capital. The marked divergence in recent years between old and occupancy and new competition rents, both in permanently settled and temporarily settled tracts, has threatened more or less the occupancy status, has led to sub-letting, and has produced the evil of *nazrana* of all kinds; and all these questions are bound up with the question of any reform in the system of tenant right. The Central Provinces Tenancy Act of 1920, in so far as it has created permanent tenure, restricted transfer and prohibited sub-letting, is a wise piece of legislation which has rehabilitated peasant proprietorship, protected cultivating interests against the moneylender, and at the same time prevented peasant proprietors from converting themselves into intermediaries exploiting the peasants below the legal peasant line. It is very interesting to find that in countries so different as Russia and an Indian province the same evils arising out of the same agricultural conditions have been proposed to be remedied by almost identical measures. In the ryotwari estates the periodical settlements have done a grave injustice to the smallholder by disintegrating the village communal system, and by appropriating a larger and larger share of the agricultural income, which if peasant proprietorship were absolute and the theory of State landlordism not carried to its present limits, would have returned into channels of permanent land improvement. The deterioration of peasant proprietorship and the accompanying free disposal of village commons on the rural communalism, as a result of encroachment and administrative policy, have proved harmful to intensive agriculture. Analogies may have been drawn with the legislative attack in England and the agrarian history in Russia.

Protective legislation for the peasant.—For remedial measures necessary to deal with the present situation we should draw freely from the experience of Japan and of the countries in Central and Eastern Europe where small holdings exist or are reconstituted by recent land reform. It must be a process of slow growth and adjustment in India, for wherever we touch the land, we handle the root system of society. Wherever we have the big estate and the estate is broken into farms which are dealt with in the produce-sharing system, we have to develop gradually towards security of tenure, on one hand, and equitable farming agreements, characteristic of the *métayage* in Italy, France and Spain, on the other. In virtue of these agreements, a veritable joint-ownership is established between the landowner and the tenant in parts of Western and Southern Europe, and the tenancy sometimes passes from generation to generation, thus acquiring effective ownership. Where we have peasant proprietorship, we should not break up the traditional village communalism, but revive the collective control over the use of the land, collective irrigation and collective cultivation. Gradually the village communities would be converted into co-operative societies so that they might make joint purchases of the necessary farm

stock, sell the produce jointly, or obtain credit in common. The case of the inferior peasantry who obtain land or stock from the richer farmers to whom a share of the produce is transferred, also demands protective legislation. The constitution of economic holdings, prevention of fresh sub-division and restriction of sub-letting and transfer seem necessary, if we wish to profit from the experience of different countries in Europe. There are, again, the farm-hands, whose condition varies in different parts of India. Some have small plots of their own or work as partners. Others move from plot to plot, while some are involved so much in debt that they sell their services for life to the zamindar's or the cultivator's family. The serf, who is still in evidence playing an important part in the machinery of Indian economic life, deserves much greater attention and sympathy than as yet he has been able to obtain. With greater solvency of the peasant farmers, with more equitable share tenancy, with the protection of the farm labourers, and with a more equitable system of taxation, we can convert the agrarian crisis, and meet a famine when it comes more courageously and more successfully, neither bewailing the mysteries of Providence, nor looting the bazaars in open revolt. The present situation is full of peril. The agrarian problem has to-day its political and social reactions; the village unsettlement and the political unrest have a direct bearing on each other.

Three far-reaching features of land unsettlement.—There are at least three outstanding features of the present land unsettlement whose effects are not confined to the economic sphere. There has been a tendency during recent years for the cultivating proprietor to lose ground to the cultivating tenant and non-cultivating rent-receiver or rent-payer. The Jotedar in Bengal, the Lingayat in Bombay and the Brahmin in Madras have given up the plough and now are dependent on the cultivating classes whose economic status has suffered. In the Punjab alone the number of rent-receivers has increased from 626,000 to 1,008,000 during the last decade. There has been also a large increase in Madras. In the permanently or temporarily settled tracts, middlemen have multiplied. Very often these classes are idle or thriftless. All this has poisoned the peacefulness of rural life and sometimes made tedious and difficult the simplest duties of routine and revenue. Secondly, the problem of industrial unrest in the cities is connected closely with the growth of the landless class in the villages. A floating immigrant population is the chief obstacle to measures of civic social improvement and amelioration. Labour legislation or housing reform, for instance, cannot be effective until the continuous cityward drift of the landless classes is checked. Thirdly, the structure of village life governs the system of polity and the change from peasant proprietor to peasant proletariat has introduced new factors in the evolution of the Indian democracy.

Oral Evidence.

37,196. *The Chairman:* Dr. Mukerjee, you are Professor and Head of the Department of Economics and Sociology in the University of Lucknow?—Yes.

37,197. We have your note of evidence which you wish to give us, for which we are much obliged; have you any corrections or statements in amplification of that that you would like to make at this stage?—On page 385 I give a table showing the percentages of cultivated area irrigated, I have added some figures for two other districts.

37,198. The earlier part of your note gives us an interesting resumé of some of the experiences of European countries in relation to the problem of small holdings and the fragmentation of holdings. On page 370 when you speak of consolidation of holdings, are you thinking of the sort of consolidation that took the shape of the enclosures in Great Britain, or are you thinking of the consolidation of an individual holding which has become

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fragmented as the result of the operations of the law of inheritance in this country?—In India, we should rather think of the fragmentation of holdings which comes as the result of the application of the law of succession.

37,199. You distinguish no doubt between sub-division and fragmentation?—Yes.

37,200. Sub-division we presume to be inevitable so long as the present law holds?—But sometimes sub-division goes to such an extent that holdings become uneconomical, and then it is very detrimental to agriculture. At the same time, there are holdings which have to be scattered about in the different soil areas of a village in order to minimise the risks of agriculture as far as possible; so that the problem of fragmentation and that of the scattered nature of the holdings are connected.

37,201. In any one village when there is great variety of land, from the agricultural point of view it is a sort of insurance to the individual to have his holding in more sections than one; that is the point, is it not?—Yes.

37,202. Have you any exact knowledge of the system which you describe on page 371 under the heading: Consolidation of holdings in Baroda? There you point out that a permissive Act for the consolidation of agricultural holdings was passed in 1920?—Yes.

37,203. Do you know the nature of that Act?—I have described the Act.

37,204. And do you know the effect that its passing may have had?—It is too early yet to speak of the effects of that Act.

37,205. Have you been watching the results?—Yes, I have been watching the reports on this subject.

37,206. Have you any views on the subject at this stage?—Not yet, except that I might refer to my book on the *Rural Economy of India* where the state of fragmentation in Baroda has been described.

37,207. *Mr. Calvert*: The Act is a dead letter, is it not?—I refer to the Act merely with a view to criticising it.

37,208. *Professor Gangulee*: Is that Act still functioning in the State of Baroda?—No.

Mr. Calvert: It has never begun to function at all.

37,209. *The Chairman*: That was rather what I had gathered. On page 373 you suggest that Governments in British India might initiate an experiment in order to advertise the possibilities of consolidation?—Yes.

37,210. And that that experiment should take the shape of acquiring suitable villages under the Land Acquisition Act, re-aligning the land properly, effecting certain improvements and then leaving the object lesson to do its work?—Yes.

37,211. Have you any indication as to how public opinion in the villages concerned would view any suggestion of that sort?—The better class of cultivating tenants in this part of India adopt a system of voluntary exchange and transfer, and I think public opinion so far as the cultivators are concerned will strongly support such a scheme. I have spoken of the traditional custom in South India according to which villages come to an agreement by which they exchange plots which may be different as regards fertility and situation; that tradition is also prevalent in Oudh and other parts of India, and there is no reason why this system should be against public opinion so far as the peasant is concerned, because, after all, the peasant knows his business very well.

37,212. Nevertheless, experience does show, does it not, that there is very often considerable opposition from a minority to any scheme of general consolidation?—That opposition will naturally arise as long as we have different

grades of tenants who have protected and unprotected rights in their holdings.

37,213. You give us an interesting note on irrigation from many points of view; in some cases you quote your authority and in other cases you do not. I do not want to keep the Commission or you waiting while I ask you for your authority in each case; but if you would look that through and, where you think the figures and facts mentioned are of sufficient importance to warrant it, let us have a note of the authority concerned, it would be very helpful—I have throughout used Season and Crop reports of the United Provinces for all the years, and also the Agricultural Statistics of British India; that literature I think you have with you?

37,214. Yes, we have those. Those are really the two sources of information?—Yes, and for the districts I have also used the Settlement Reports and District Gazetteers; that is my authority.

37,215. Then I think that covers the point. Have you studied the economics of irrigation by tube-wells in detail?—I have depended upon reports and blue books.

37,216. I wondered whether you had formed any view as to whether sufficient information was available on that matter in this Province, and, if not, whether sufficient research was being carried out?—I approached the Agricultural Engineer of this Province for some facts relating to the lowering of the water level about which I have spoken, and which I think has been one of the great handicaps to agriculture, especially in the south-western parts of this Province. His figures are very recent, and I do think research on those lines ought to be conducted in the different districts where we have complaints from the peasants as regards this lowering of the water level. I have got a statement from the Agricultural Engineer showing this decline of the water level from 1906 to 1926, which was prepared at my request. The Engineer told me that earlier figures could not be prepared, and for them I have to depend on the District Gazetteers.

37,217. On page 387 of your note you suggest that it might be possible to combine well irrigation and canal carried irrigation so as to supplement, particularly in the *rabi* season, the shortage in the supply carried by canals. Do you think that the difference in cost, to the cultivator, of water from a well as compared to the cost, to the same cultivator, of water from a canal, might raise difficulties in this connection?—As a matter of fact, in this Province more than half the irrigated area is well-irrigated, and the cost factor did not come in. In tracts where the canal has been introduced there has been a deterioration as regards the number of croppings, and well irrigation shows a more elaborate rotation of crops than canal irrigation.

37,218. I rather gathered that you were thinking of extending well irrigation to areas already supplied from the canal system?—In every part of this Province—both canal and well irrigation supplement each other, and where the canal has superseded the well, agriculture has deteriorated, or, at least, become more uncertain.

37,219. So that as long as there is a definite shortage in canal-carried water, your cultivator is prepared to pay for well irrigation? But there is another suggestion of which you have probably heard: that is, that in the higher levels of areas commanded by canals, cultivators should be persuaded to supplement their supplies of canal-carried water by water pumped from wells, so as to leave more water to run down the canals and thereby increase the amount of canal water available in the lower levels?—In the higher reaches, the difficulty is also experienced that the well level has risen too high, and non-masonry wells, which are very common in this part of India, go out of use.

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37,220. I suppose it is not very difficult to persuade the cultivator to use canal water when it is available instead of his having to use well water?—There is such a thing as habit.

37,221. And there is such a thing as having to pay a little more for the water, I suppose?—Well irrigation is generally responsible for a more elaborate system of rotation of crops.

37,222. On page 387 you say: "As the rainfall seems to be the ultimate limiting factor in agricultural progress, a more systematic policy of afforestation . . . must be followed?" To what extent do you connect rainfall and afforestation?—It is an admitted truth that the denudation of the hill-sides and the destruction of forests have reacted very unfavourably upon the regularity and distribution of rainfall in Northern India. We see now the Indian desert gradually extending towards the south-western districts of this Province. There has been a very great diminution of rainfall within recent years, and it has also become very irregular.

37,223. No doubt deforestation encourages soil erosion and affects the whole problem of the run-off drainage, and so on, but do you think that forests affect the rainfall?—Forests do increase precipitation, and investigations in America in the Mississippi Valley have shown that the forests are responsible for greater precipitation in the south eastern districts.

37,224. That is the theory held by certain persons? But do you happen to know whether it is held by the Meteorological Department in India?—The Meteorological Department will certainly support this.

37,225. In a supplementary note on page 398, you give us your views on the general land situation in India. Any suggestions for the reform of the tenancy laws are, as you probably know, altogether outside our terms of reference; but we are quite prepared to hear your views as to the effect that the existing laws and practices have upon cultivation and the well-being of the cultivator. You attach great importance, I understand from these notes, to that fact?—My main point is this, that unless you improve the land tenure and the revenue system there will be a drag on the improvement of agriculture. There has been in recent years a tendency for the cultivating proprietor to lose ground to the non-cultivating rent-receiver. In every part of India there are a class of what may be termed intermediaries and parasites who intercept a large portion of the profits from agriculture. Unless we have a thorough overhauling of the land system, I am afraid the recommendations of this Commission will be of no great avail so far as the prospects of improving the condition of the actual tiller of the soil are concerned.

37,226. Do you regard the tenancy laws as one of the most important factors?—Yes.

37,227. If that is so, would you not expect to find a greater disparity than in fact exists between the state of the cultivators in zamindari areas and that in ryotwari districts?—In the ryotwari districts we have under the proprietor a large number of middlemen who separate him from the actual tiller of the soil, while in the permanently and semi-permanently settled tracts there is, as a result of sub-inefeudation and sub-division of rights in land, a class of rent-receivers who are getting more and more of the profits which really ought to go to the actual tiller of the soil.

37,228. Have you ever studied the economics of actual holdings, typical of holdings held by cultivators in this country?—I have undertaken intensive surveys in many parts of this country.

37,229. Have you ever carried them out?—Yes.

37,230. Would you tell the Commission where you carried them out?—The Lucknow University has been making different inquiries in the districts of Agra and Oudh, and we have also been conducting investigations

regarding the conditions of employment of agricultural labour, the average agricultural indebtedness, the size and distribution of holdings, and so on.

37,231. Through what agency are you carrying out these inquiries?—Through the post-graduate students.

37,232. Of what ages are those persons?—From 22 to 26 years of age.

37,233. Are they graduates?—Yes.

37,234. Are they, as a rule, men with any experience of rural life?—They are generally villagers.

37,235. And they carry out their inquiries according to a fixed schedule?—I do not give them a questionnaire to go by, but I guide their inquiries step by step and materials are gathered as new points of view are brought forth from the villagers.

37,236. *Professor Gangulee*: Have you published any book in connection with that?—The University hope to publish a monograph on the subject.

37,237. *The Chairman*: Is it not a fact that people who live in towns the world over, as a rule, know very little of the agricultural conditions?—In India all people are villagers.

37,238. Are they?—Yes; the cities have been of very recent development. As a matter of fact, by habit, tradition and psychology, we are all villagers.

37,239. Do you think the average graduate of an Indian University knows all about rural life?—The difficulty is this, that in most Universities agricultural economy is taboo; we are teaching a new type of urban industrial economics with which they are very unfamiliar and which has emerged from a study of Western life and conditions.

37,240. *The Chairman*: Do you think there is room for a Degree in Rural Economics?—In some Universities rural economics form a very important subject; in the Lucknow University, for instance, there are three papers and we give the M.A. Degree in Rural Economics. We have an independent paper on Indian Agriculture, another on Land Tenures and Agrarian Legislation, and a third one on the Co-operative Movement in India. Mr. Calvert has been one of our examiners.

37,241. Are you devoting a great deal of your own teaching time to rural economics?—Yes, I am teaching rural economics and sociology; and for the last five years I have been writing books on rural economics as well.

37,242. What proportion of your pupils come from rural districts?—They all come from the villages with the exception of one or two.

37,243. And how long have these lectures in rural economics been established in the University?—For the last three years.

37,244. So that it is difficult to gauge the effect yet?—So far we have investigated certain rural economic conditions and we are going to publish the results. The advanced students have been allowed to substitute for a paper in the written examination a thesis based on local surveys, and some of these surveys are being published now.

37,245. Do you find that interest is being taken by undergraduates in these lectures?—Yes.

37,246. They are enthusiastic about the subject?—Very enthusiastic I should say.

37,247. Are you satisfied yourself with the way in which these young graduates have carried out the economic surveys that you have arranged for?—The best students usually understand the methods of such surveys, and so far I am satisfied with their work.

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37,248. Do they report as to the attitude of the villagers towards an inquiry of that nature?—At first they had to combat the fears and suspicions of the villagers, but gradually these fears and suspicions were dissipated.

37,249. Suspicions about new taxation, I suppose?—Yes; but gradually they were won over and they gave the right information.

37,250. *Sir Ganga Ram*: You have nothing to do with the Agricultural College?—No.

37,251. You are preparing students for a commercial degree?—No; I am preparing students for the M.A. degree in Economics.

37,252. Economics is a general term; what economics do you refer to?—Rural economics. There are alternative courses in economics and one course is rural economics.

37,253. What are the prospects in life of your pupils? What do they ultimately become?—They become teachers in colleges and Universities, and they are also absorbed in the Co-operative Department of the Government.

37,254. They do not go into agriculture?—No; we teach economics more than agriculture in our University.

37,255. Are all your figures with regard to irrigation based on your personal knowledge?—They are based on the Season and Crop Reports and also the Agricultural Statistics of the Government of India.

37,256. Have you any personal knowledge of agriculture?—Yes.

37,257. Where did you practice agriculture?—I have not practised agriculture, but I have seen farming in different parts of India.

37,258. Have you seen it in the Punjab?—Yes.

37,259. Where?—I was for some time in Lahore.

37,260. Have you any knowledge of tube wells?—I have no direct knowledge of them; I am not an engineer.

37,261. Is the whole Province supplied by canal water?—I have said in my note that 50 per cent. of the irrigated area of this Province depends on wells.

37,262. *Sir Thomas Middleton*: In connection with agricultural labour you refer to payments in kind. Are these payments in kind the rule or the exception in this Province?—They are the rule rather than the exception.

37,263. Can you give any information as to whether other parts of India show differences in this matter? Are there areas in India where the payment is only in kind?—As we approach the industrial centres in different parts of India we see more and more payments in cash rather than payments in kind.

37,264. You have noticed, no doubt, the very great variations in the money wages of labourers in the different parts of India. If you compare this variation in local wages with the variation in local prices, you will find that the variation in prices is relatively small. How do you account for the great variation in cash wages?—Grain wages are usually fixed by custom, and custom takes a long time to change. On the other hand, cash wages are far more mobile. We undertook an enquiry into the relative differences of money wages and real wages of agricultural labourers in a district in the United Provinces and we found that the curve of agricultural wages did not follow the curve of prices; in fact it lagged behind. That shows that it takes a very long time for village conditions to adapt themselves to the new conditions.

37,265. Did it lag one season behind?—No; it lagged behind throughout.

37,266. Has there been a gradual rise or was there a sharp rise in 1919 and then a decrease?—No. Investigations of this type have been undertaken in Bombay by the Bombay Labour Office and Professor Myles undertook a similar investigation in Lahore; but we cannot at present say anything definitely about the relative difference between the money wages and real wages in the different parts of India.

37,267. We found, in questioning a landowner in the United Provinces, that he was paying 4 annas for a male labourer, and I think in Bombay they pay 8 to 10 annas per day. How do you account for the wide difference in these two Provinces when the price of provisions is fairly similar in both?—In this Province we have a larger surplus of agricultural labour population than anywhere else in India. In Bombay the factories are still clamouring for more and more agricultural labourers, while Cawnpore cannot absorb the full volume of the labour supply of this Province. Jamshepur and the mines in Bihar do attract a large amount of labour, but still agricultural conditions are very much depressed as a result of the enormous number of agricultural labourers in these Provinces.

37,268. I understand that there is a good deal of emigration from certain districts of these Provinces to Assam and other tracts?—But even when we speak of the exodus to the Assam plantations there have been years when this emigration was suddenly checked because the money wages in those plantations were found to be on a level with, or even lower than, the agricultural wages in districts like Benares, Gorakhpur and others. But now the tea industry has recovered and the emigration is continuing.

37,269. What is the effect of that migration on wages paid in the districts from which emigration takes place as compared with the other districts?—It has not been such as to affect materially the prevailing wages in those rural tracts.

37,270. You have not been able to discover in your economic studies any definite relationship between emigration and the rate of wages?—Not as yet in the rural districts. If the volume of emigration continues for a very long time and if the wages continue to be much higher, there will surely be a rise in agricultural wages; but that is a state of things which we cannot contemplate at present.

37,271. You mention the passing of land into the hands of the non-landowning class. You are referring, I think, mainly to lands handed over to moneylenders on mortgage? Is that what you had in mind chiefly?—No. As a result of the fact that the Indian Tenancy Law contains no effective restrictions on subletting, the cultivator proprietor is becoming more and more dependent on the cultivating classes. There is, in the first place, the mortgaging and the transfer of land to non-agriculturists; but there is also at the same time the tendency during recent years for the cultivating tenant to become more or less an inferior landlord, so that his holdings are let to people who have no legal protection against enhancement of rent or eviction. This danger is effectively combated in the Central Provinces, but it exists in almost every other Province.

37,272. I have heard that there was a tendency in that direction during a few years, when cotton prices were high, for example; but I should think that that particular tendency has now disappeared?—There is a village twenty miles from Amraoti where I found that the *Lingayat* was subletting his land at ten times the rent which he gives himself to the landlord; it is a cotton-growing village.

37,273. Turning to another point: what about the effect of the narrow market for capital on the price of land in India? There has been in recent years a certain accumulation of wealth in India and the scope for invest-

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ment is limited in a country with so few industries as you have. What effect must that have on the price of land which comes into the market?—In India, so far as the middle and professional classes are concerned, investment in land gives them a social status, and so they seek investment in land more than investment in industry or trade; that is the reason why our lawyers and other professionals are acquiring land in the villages.

37,274. Apart from that desire to improve their position, is there not a real tendency to seek a real economic investment in land because it is regarded as a safe investment?—It would have been called an economic investment if they participated both in the risks and in the profits of agriculture. Here there are a large number of intermediaries, and their encroachment upon the land held by cultivating classes means that they get the surplus profits of agriculture which formerly were enjoyed by the cultivators themselves.

37,275. You use the phrase "the decline of peasant proprietorship" In what sense do you use the word "decline"? Decline in the state of the individual peasant or decline in the total area occupied by the peasant?—I mean the latter, the total area. More land is now held by cultivating tenants which was formerly cultivated by peasant proprietors themselves. There is also a deterioration of status due to the fractionisation of holdings.

37,276. *Sir James MacKenna*: What text-books do you use in Indian rural economics?—Books by Mr. Calvert, Mr. Darling, Mr. Keatinge and Mr. Moreland; I have also some publications of my own.

37,277. Do you agree that one of the main obstacles in the way of agricultural improvements is the smallness of the holdings?—Yes.

37,278. I would like to put a case before you as an economist. I have heard it suggested that all small holdings should disappear, that large holdings should take their place and that the landlord should hire the present small holders as labourers, applying the improved methods of cultivation and ensuring a fixed wage to the small cultivator against bad monsoons and all other troubles; this, it was submitted, would be a better position for every one; the out-turn of land would increase as a result of improved agricultural methods and the wages of labourers would of course increase. What is your view of that position?—That line would suit a new country where there are large estates and no people to work. How will you employ the displaced rural population?

37,279. You can employ them as labourers?—The industrial development of India has not proceeded so fast as to absorb the vast agricultural labour population of this country.

37,280. You do not agree with that view?—The intensive enquiries conducted by me show that one-half of the tenant population in Oudh possesses holdings whose size is below the subsistence limit of three acres.

37,281. But then there would be fixed improved wages?—There would be much economic unsettlement and unrest.

37,282. *Professor Gangulee*: What exactly do you mean by the expression "economic solidarity" of the joint family?—I mean solidarity based on the collaboration of the different members of the family in agricultural work.

37,283. Are you definitely of opinion that economic solidarity of the joint family of which you speak is a help to rural economy?—It has been a great help in the rural areas.

37,284. Is it still now?—Yes, it is now.

37,285. You say on page 372 that "the secret of the success of the more prosperous cultivators lies in a determined adherence to the joint family system." Could you amplify that statement a little?—In the first place, the joint family has meant that the different members of the family, in-

cluding also the women, take an active part in field work; in the second place, it has also meant that the holding is managed by the best member of the family. The tradition is very common amongst the villagers that when any of the younger sons insists upon a partition, they do not divide the property at all, but the deserter is settled or accommodated in a different village altogether. If this tradition has continued, it is indicative of the great economic opportunity which is derived from the joint family so far as agriculture is concerned.

37,286. Do you consider that these traditions are still very much alive?—The traditions are very much alive in this part of India.

37,287. And will it survive under the impact of the present day economic tendencies?—Yes; in the Punjab, the joint family instead of disintegrating amongst the peasants is actually gaining strength. The recent Census Report of the Punjab goes to prove this.

37,288. You are of opinion that this tradition of the joint family has been affected by the importation of individualistic doctrines of property?—Yes.

37,289. And you suggest that we in India never had the individualistic notion of property before?—Not in the sense of free transfer and sale of cultivated land which we have got from the English law and the modern court decisions.

37,290. On page 370 you speak of the low standard of subsistence. Would you associate the low standard of subsistence with the density of population of a given tract? You seem to suggest there that in the more populous part of the country the conditions of agriculture are such that it is no longer profitable?—High density of population does not necessarily entail a low standard of living; there are parts of India such as Eastern Bengal, parts of the Punjab and Travancore, where, in spite of a density of population four or five times that of agricultural Europe, a population can be maintained at a fairly high standard of living, and a standard which is being gradually improved day by day.

37,291. It depends not only on the method of cultivation but also on other economic factors?—Yes; for instance, the system of rotation of crops in Eastern Bengal is an object lesson to India, and the standard of living of the peasant in Eastern Bengal would be much higher than the standard of living of the Italian, Spanish and Balkan peasantry.

37,292. What is the elaborate system of rotation in the well-irrigated areas of which you speak?—In many parts of these Provinces canal irrigation has reduced a two-crop system of farming to one of only one crop, and in that way the system of farming has been lowered.

37,293. Given water, they can grow other crops?—Yes, in the districts of Gorakhpur and Basti we have several croppings, and it is the elaborate rotation of crops which is responsible for the high rural density of these districts.

37,294. You discuss this question of consolidation of holding in Baroda, but you make no mention in your note of the Punjab consolidation work?—Mr. Calvert's scheme is too well known and it requires no reference.

37,295. Have you studied and observed the working of the Punjab system?—I have only studied that from the reports; when I was in the Punjab I had no opportunity of studying it.

37,296. Do you think that system could be applied to other Provinces?—Yes; in fact the co-operative movement is only utilising an indigenous tradition. In parts of this Province, there is a vital tradition with regard to the voluntary exchange of holdings: when peasants find that their holdings have become much too scattered, they assemble in the panchayat and bring about a co-operative or voluntary transfer of holdings so as to make

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them into more compact blocks. In that way the co-operative societies are merely utilising or emphasising a tradition which was very much alive but which is now decaying.

37,297. Is this tradition found anywhere except in this Province?—Yes; so far as I know, I find vestiges of that tradition in every part of India.

37,298. You think that tradition might be revived through the co-operative societies?—Yes; but the difficulty is that, in some Provinces, holdings have to be scattered so that the holdings may be situated in different soil blocks in order to minimise the risks of agriculture as far as possible, depending, as it does, on rainfall. In tracts where agriculture is less dependent upon rainfall a scheme of consolidation would have better chances of success.

37,299. So that before you attempt consolidation, you have got to satisfy the first pre-requisite, namely, facility for irrigation?—Yes.

37,300. And the second pre-requisite?—In case the population be very dense, we must provide employment for the displaced population.

37,301. You speak of an economic cultivation unit; in the course of the enquiries you have been conducting in the University of Lucknow, have you been able to find out what you describe as the economic cultivation unit in different tracts of the Province?—It is three acres intensively cultivated; that unit of course varies with reference to irrigation and other factors. Naturally it varies with reference to rotation of crops, fertility of soil, nearness to the market, but on the whole you may say that three acres would represent the average size of the economic cultivation unit. Below that limit the peasant has to starve or his standard of living has to be lowered.

37,302. In how many districts in the United Provinces have you carried out this investigation?—In four or five districts chiefly.

37,303. Will you tell the Commission how you arrive at these figures?—I shall publish it very soon under the title *The Fields and Farmers in Oudh Villages*.

37,304. You say that, in Agra and Oudh, in the absence of fixity of tenure the tenants have no desire to improve their holdings?—The non-occupancy tenants have no fixity of tenure.

37,305. Do non-occupancy tenants predominate in Agra now?—Yes.

37,306. Has not their situation improved since the passing of the Agra Tenancy law?—It has improved their position, but only very partially; it has not gone very far.

37,307. *Mr. Calvert*: On page 368 you say the tendency towards sub-division has been manifest in India only during the last few decades. Is that statement based on a careful study of village maps over a series of years?—Yes. I would refer in this connection also to Dr. Mann's *Land and Labour in a Deccan Village*, in which the history of sub-division of holdings in a village for the last three centuries has been given. There we find that it is only during the last few decades that this tendency has become particularly manifest.

37,308. That is in one particular village?—Yes, that was the result of a very intensive enquiry in a particular village, and similar enquiries in different parts of India have strengthened the presumption that this phenomenon is of very recent growth, because it is definitely connected with the enormous multiplication of population, which is very recent.

37,309. Has there not been a certain amount of expansion of cultivation in the last 50 or 100 years?—Yes.

37,310. Do you think the increase of cultivation in the villages has led to fragmentation?—Where the population has multiplied enormously within

the last three or four decades the effect of the tendency to which you refer has become manifest with regard to sub-division, but not otherwise.

37,311. That is to say, they have brought under cultivation odd pieces of land which give the appearance of fragmentation?—That would emphasise the scattered nature of the holdings rather than fragmentation.

37,312. Are you in favour of emigration overseas as a means of relieving excessive pressure of population?—Certainly, but the restrictive policy adopted in some countries gives us very little hope in that direction. I would depend more upon inter-provincial emigration, and I think it is necessary for Government to open out new facilities for emigration to labour districts.

37,313. Do you think, with regard to emigration, there is a conflict between sentiment and economic advantage?—So far the peasant of the United Provinces has not shown himself conservative or stay-at-home at all; he has gone to distant malaria-stricken plantations in Assam and he has gone to distant Africa.

37,314. And improved his position?—Yes.

37,315. So that there is a certain conflict between the economic aspect of the question and the sentimental aspect?—What do you mean by the sentimental aspect? Of course, a peasant likes to continue in his home.

37,316. Do you think the politician wants to prevent the peasant from going although the peasant by going overseas can improve his position?—I think there are very few politicians who are opposed to the emigration policy.

37,317. *Professor Gangulee*: They are against the indentured labour system?—That was a vicious system.

37,318. *Mr. Calvert*: You refer to cycles of wet years and dry years. Do you think there is such a thing as a recurring cycle of wet and dry years?—Yes, there is.

37,319. Do you think we have sufficient evidence to support that statement?—I have submitted my suggestions in a very tentative form, but so far as recent data are concerned, we have one wet cycle followed by two dry ones, and now from 1916 onwards we are in the midst of a wet cycle; very probably it will be found to have ended in 1926, and we expect 1927 to be a dry year.

37,320. For how many years do you think we should secure records before asserting that we have found a cycle?—This is the evidence not of the economist but of the meteorologist in India; I have drawn my opinion from the meteorologist.

37,321. You refer back forty years?—1886 is my starting point.

37,322. Do you think forty years is sufficient?—It was sufficient for the meteorologist to establish that hypothesis.

37,323. Of which meteorologist are you speaking?—You will find this subject discussed in the Season and Crop Reports of these Provinces.

37,324. In your note and in your oral evidence you have referred to the increase in the number of landlords living on rents?—Inferior landlords.

37,325. Does that point to increasing prosperity; that now the rents are so high that they can live on the rents without having to work?—That has happened in some Provinces, such as the Punjab and Eastern Bengal, where there has been an enormous rise in land values.

37,326. After all the ideal of mankind is to live without working?—That is a fact.

37,327. So that more and more are achieving this ideal?—We want partners rather than parasites.

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37,328. You point to a decrease in farm servants and field labourers and an increase in those who have taken to cultivation? These have passed into the tenant class, I take it?—Not necessarily; they may have left the Provinces for work in the factories, mines and plantations.

37,329. But the number of cultivators has increased?—You are speaking of the Punjab?

37,330. No, you are quoting a whole series of Provinces all of which show the same result, that is to say an increase in cultivators and a decrease in labourers? Does that not show that the labourer is passing into the cultivator class?—Yes, in some cases that is so, but in others they are actually displaced in the villages and have to seek employment abroad.

37,331. You do not think that this is due to the fact that the labourer is improving himself by becoming a cultivator?—That does not necessarily imply any improvement in the agricultural condition. It may be that he acquires sometimes the status of an occupancy tenant, but in most cases, as I have just said, the labourer has to seek his living elsewhere on account of the depressed conditions. In Madras the *mirasdars* have also been faced with the same difficulty in obtaining their labour force to work on the farms.

37,332. On page 390 you say: "By a selective process, the superior cultivator is driving the more thriftless of his brethren to the marginal areas." Do you mean that this has actually taken place?—This is a universal tendency, and investigation shows that this is actually the case.

37,333. Then you say, "the extension of cultivation results, if at all, in a gradually diminishing return to an increasing amount of labour and expense." Do you think that has taken place in the Punjab Canal Colonies?—There you are dealing with a new country where new lands are being reclaimed and the conditions are very different from the conditions in an old Province like ours.

37,334. This only refers to an old Province?—Yes, not only to the United Provinces but also to Bihar and Orissa.

37,335. *Professor Gangulee*: And Bengal also?—Yes.

37,336. *Mr. Calvert*: Then you say that "the figures of the transfer of land by agriculturists to non-agriculturists show that the tendency of the latter to take possession of the agriculturists' land is to a certain extent increasing . . ." Have you any figures for the United Provinces showing the transfer of land to non-agriculturists?—The United Provinces Settlement Reports give no figures relating to the transfer of holdings to non-agricultural classes, but I have got figures from Bihar and Bengal. I have tabulated the figures for some of the Bihar districts and also for Bengal.

37,337. With regard to the transfer of holdings to non-agriculturists?—Yes.

37,338. Are these mostly moneylenders?—Yes. I have a very interesting table* which shows the distribution of sales in the district of Saran among landlords, lawyers, moneylenders and ryots. According to this the shares of the lawyer and the moneylender have increased, whereas that of the ryot has fallen. The report of the Survey and Settlement operations of the district of Saran between the years 1913-19 shows that the number of transfers by sale or mortgage to the moneylender has increased alarmingly.

	Last settlement.	Present.
* Landlords	5·77	3·80
Lawyers	·92	1·70
Moneylenders	9·85	22·95
Ryots	83·96	71·55

37,339. Have you any figures to show the increase in the number of moneylenders in the United Provinces?—No; there is nothing.

37,340. *Professor Gangulee*: What about Bengal?—The tendency is the same there.

37,341. *Mr. Calvert*: Have you in your inquiries found any connection between the cultivator's idea of what a pair of bullocks can do and the amount of land he cultivates?—Yes, in many parts of India the cultivator does not measure his land in *bighas*, but in pairs of bullocks. One pair of bullocks in this Province would, I think, cultivate three or four acres of land. In Gorakhpur, where the population has multiplied enormously, the people cannot afford to keep cattle, and cattle are borrowed from other cultivators who possess them. The problem has become very acute in some of the eastern districts now.

37,342. I should like to have your opinion on a proposal which has repeatedly been made to us, namely, that we should recommend a cess on the export of wheat and rice in order to build up a fund to pay for research in wheat and rice?—I am strongly against an export duty on agricultural produce; but the case need not arise here because the whole problem has been set at rest by the Report of the Fiscal Commission.

37,343. It has not been set at rest so far as we are concerned. Do you think that the imposition of a cess on exported wheat would have the effect of bringing down internal prices?—I think it would be very injurious to the peasants.

37,344. *Mr. Kamat*: With regard to Question 25, under "General land situation in India," you say: "Neither scientific agriculture nor co-operation can make much headway unless we reform the land system, now so serious a drawback to the prosperity of the small farmers." Suppose you were to write on a clean slate and you were left to yourself in this matter, what sort of land system would you have for India?—It has got to be adapted to particular conditions and to the historical traditions in the different Provinces. For instance, in the Punjab and Madras, you have peasant proprietorship; in Bengal you have another system. There is ample scope for tenancy reform in Bihar, in Bengal and in the United Provinces as well.

37,345. Would you retain these local conditions?—Yes.

37,346. And only improve them?—Yes, gradually. At the same time I believe that, without reform, improved scientific agriculture has very little hopes of success.

37,347. *Sir Ganga Ram*: In what direction do you want a reform?—That is a very vast problem, which is beyond our scope.

37,348. *Mr. Kamat*: You say: "The inefficient system of agriculture that prevails indeed is connected less with tillage practice than with the forms of tenure now overshadowing the ancient peasant proprietorship." Do I understand you to say that, where the ryotwari system prevails, there the farmer is better off than in other tracts of the country?—In the permanently or semi-permanently settled tracts, on account of the importation of a large number of intermediaries, the whole profits of agriculture do not go to the tiller of the soil, so that the cultivator is as badly off in Madras as he is in Bengal or Bihar or the United Provinces.

37,349. But where the ryotwari system prevails, has the cultivator improved in his purchasing power distinctly, as compared with the cultivator where intermediaries prevail?—No; in the ryotwari tract the Government, by increasing the land assessment from time to time, is encroaching upon the peasant's stock of agricultural capital; the peasant has perforce to stint his standard of living in order to meet the growing demand.

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37,350. Do you frankly mean to say that what the intermediary pilfers in the tenancy tract, the State pilfers in the ryotwari tract?—I would not use such a strong term as “pilfers,” but I do think that a modified State landlordism which, in reckoning economic rent, assures the cultivator an adequate standard of living and a return of the land revenue to the labourer in wages that will increase his efficiency is the line of future reform.

37,351. In this Province we have been told by a witness representing the Revenue Department that revenue settlements have been growing more and more liberal, and he supported his statement by showing that at one time they were 20 per cent. of the total outturn and they have now come down to something like 2 per cent.?—I submitted a note on the taxation of agricultural incomes before the Indian Taxation Enquiry Committee, showing the rates of assessment in the different Provinces.

37,352. I am asking you about your own Province and what your view is about this definite statement made on the basis of facts?—I am not able to follow you.

37,353. What the witness said was this. In 1840, if the assessment was 20 per cent. of the outturn per acre, at the present day it has come down to much less; it is now 2 or 5 per cent. of the outturn per acre—in kind translated into values. Therefore, your theory that the State is pilfering from the increase in the yield of the cultivator does not hold good if that statement of the Revenue Department is to be accepted?—I may say this with regard to the land revenue of the United Provinces. In 1886-87 the land revenue of the Provinces was 580.7 lakhs, in 1902-3 it was 636 lakhs, and in 1922-23 it was 914 lakhs. The index numbers of agricultural income per head are respectively 100, 106 and 130. The corresponding figures for total cropped areas are 35 million acres, 34 million acres and 33 million acres.

37,354. *Mr. Calvert*: Have you worked out the gross value of the produce?—It is difficult to work it out for a whole Province. What happens is this: either there is an over-estimate of the profits or an under-estimate of the expenses of cultivation.

37,355. *Mr. Kamat*: What is your total land revenue in this Province?—It was 914 lakhs in 1922-23.

37,356. What was it about ten years ago?—521 lakhs.

37,357. So it has been steadily increasing?—Yes.

37,358. So it does not support the statement that the revenue assessment is going down?—I think he meant assessment on the profits of cultivation; I cannot say.

37,359. You say on page 399: “The creation of landlordism, both of superior and inferior grades, and the break up of peasant proprietorship and the village system in India, have been the result of misunderstanding on the part of early British administrators who derived their lessons mainly from the agricultural history of Western Europe.” Would you explain what you mean exactly by that, taking your own Province as an example? Do you mean to say that the village system, or landlordism, or the talukdar system, was not an ancient system?—Landlordism of the feudal type did exist in India; but now landlordism has become the universal type in most parts of Northern India.

37,360. What is the new system which has been introduced on the model of Western Europe?—When the English Settlement Officer came to Northern India he thought that the greatest handicap to agriculture was the communal routine. As the village community came to decline there was the decline of those traditions of agricultural partnership, for instance,

the common maintenance of pasture lands, the maintenance of irrigation channels and tanks and so on.

37,361. *Professor Gangulee*: Did the village community decline as a result of the Settlement Officer's operations?—In interpreting some of our old customs, he was governed by individualistic notions. He felt that free sale and transfer of land were the only opportunities which could give the present owner an opportunity to improve himself.

37,362. *Mr. Kamat*: In the Indian States, does the old village system prevail intact?—There has been enormous change there also.

37,363. Since communications, telegraphs, local bodies, etc., must come in, a certain amount of change from the old system is inevitable?—Yes. In the Punjab we had to legislate against the transfer of land from agriculturists to non-agriculturists. That would not have been the case when the village communities all along exercised the right of pre-emption which exists in the different parts of India. The panchayat was there, and it made it impossible for the moneylender from the outside to come in and get a slice out of the land of the cultivator in the village. Now, in so far as the British law has retained the law of pre-emption, it means that we still think that the village community has not outgrown its uses.

37,364. So the problem is we have to adjust ourselves to the new conditions and yet resuscitate, where possible, the old system. Have you heard of the efforts made to introduce the village panchayats and the result of those efforts?—I think that if the village panchayats are entrusted with the powers of taxing the villagers for the maintenance of village channels, tanks, pasture grounds, education, or the treatment of village cattle against epidemics, it would be a very good thing.

37,365. In certain provinces, in spite of the passing of the Village Panchayat Act, village panchayats have not grown, and it seems that people do not like to resuscitate the panchayats for fear of taxation?—That is because full powers have not been given to them. For instance, the final authority rests more with the District Magistrate than with the president of the panchayat. If you believe more in the panchayats, they will show better work.

37,366. In one place in your statement you say the economic position of the smallholder has deteriorated. Here, again, evidence has been tendered before us to show, on the other hand, that the smallholder has a surplus in normal years. Do you agree with that view?—I have given a *resumé* of the recent agrarian history, and my main point is that as a result of the multiplication of population and as a result of the changes in landlordship and tenantry which have brought about a large number of intermediaries, the small cultivating tenant has suffered very much.

37,367. In spite of the rise in prices?—Yes.

37,368. You say: "In Madras field labourers are sometimes required to work with two intervals from 4.30 a.m. to 6 p.m." Have you made personal observations?—Yes; I have been there myself.

37,369. You say: "In the Bombay Presidency, men engaged for one year work from 7 a.m. to 6 p.m." Is that also correct?—Yes.

37,370. When you mention these facts about hours of labour and so on, what actual definite suggestion have you at the back of your mind to improve the lot of the labourer?—We should think about some legislation to protect the agricultural labourer against these long hours of employment under unhealthy conditions.

37,371. You mean, on the model of factory legislation regulating the hours of work? You want that field labour also should be regulated by legislation?—Yes; of course, the whole question needs very detailed consideration.

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There are great difficulties in applying legislation to this field. For instance, agriculture is not systematised. During the harvest season, or when the monsoon breaks, the labourers have to work for long hours; otherwise the whole season's crop would suffer. These conditions have to be studied very carefully, and they will be different in the different Provinces.

37,372. Supposing you have recourse to legislation, do you not think you will be unsettling the ordinary normal conditions of village life to such an extent as to affect the profits of agriculture?—I do not think so.

37,373. Is it your experience of the workmen in this country that, given shorter hours, they work as sincerely and as honestly as they really ought to?—The experience of the Indian factories has been that the shorter hours of labour have been accompanied by larger industrial output.

37,374. Will it apply to field labour?—It will.

37,375. *Sir Ganga Ram*: Are you holding the same position as Mr. Myles holds in Lahore?—Yes.

37,376. Can you tell me how many of the students who go up to B.A. or M.A. take up mathematics?—There are approximately 250 students in the economics classes and 100 in mathematics.

37,377. For what reason do people take up your subject?—Is it because they can get through easily?—People now wish to learn such subjects as economics and political science; they take interest in these matters.

37,378. What is the career open to such students?—It is a part of liberal education, in the first place.

37,379. After all, mere education does not provide the means of subsistence. With what career in view do they take up such subjects?—We do not teach for the sake of the career; we teach the subject for its own sake.

37,380. But the students take up their studies only with a view to taking up some career?—It is for their guardians to look out for their careers.

37,381. In the Punjab, out of 1,000 students, 800 take up economics. Is your curriculum here the same as in the Punjab?—I have not studied the curriculum in the Punjab.

37,382. Are you also preparing the boys for the Commerce Degree?—We have a separate Commerce Faculty.

37,383. Are you the Professor for that Faculty also?—No; the Faculty of Commerce is quite separate; economics is a part of the Faculty of Arts.

37,384. You do not take up those subjects?—No; commercial subjects, such as banking, insurance, bookkeeping, accountancy, are left to the Faculty of Commerce.

37,385. In the Punjab the student of economics is regarded as being a jack of all trades and master of none?—I know, but I hope I do not create that impression.

37,386. I do not know how it is in the United Provinces, but in the Punjab boys from the Commercial College are regarded as being at a discount in the commercial world; when a young man applies for a position in a bank, for instance, and says he holds the degree of Bachelor of Commerce, he is rejected. Can you account for that?—Our students are accepted in the Government as well as in mercantile establishments.

Then I may be wrong in regard to that.

37,387. You say that the rotation system of Eastern Bengal is an eye-opener to the whole of India. Will you explain that?—I am speaking of the number of croppings that a cultivator gets from his field; there are three varieties of rice, besides there are *arhar*, vegetables and the pulses.

37,388. There are not three varieties of rice in the same field, are there?—Yes, in the same field, they grow in different seasons of the year.

37,389. Have you personal knowledge of the outturn of those three crops of rice?—I have no figures with me.

37,390. Well, I will tell you: the total of the outturn of all three crops is not equal to one in the Punjab?—Unless you give me facts to substantiate that, I will not accept it.

37,391. You said that canal irrigation had reduced your two crops to one; what two crops were you referring to?—The *kharif* and *rabi*, and where it is not a perennial irrigation canal, the one crop has suffered.

37,392. Then canal irrigation should be regarded as being at a discount?—Yes, it is in some areas. When you discuss agriculture you have always to remember local conditions and circumstances.

37,393. Yes, but I know from personal knowledge that where well irrigation and canal irrigation go together, the cultivators are clamouring for canal irrigation?—That is perhaps true of your district.

37,394. They want to extend canal irrigation; why is that?—Because it has suited the system of farming which is prevalent in your locality, the particular soil and climatic conditions.

37,395. You said that a holding of three acres was sufficient?—Yes.

37,396. What is the gross value of the produce of three acres?—I cannot tell you that off-hand; but that is the conclusion arrived at as the result of detailed investigations. As I have told you, this will be placed before the Commission in book form *very soon*.

37,397. It is not out yet?—It is not yet printed.

37,398. When you speak of "agricultural labour" do you mean labour employed in agriculture or labour derived from agriculture?—I use that expression in the same sense as that in which it is used in the Questionnaire of the Commission.

37,399. When you speak of "agricultural labour" do you mean the labour of people of the agriculturist class who have not got land to cultivate, or do you mean outside labour employed in agriculture?—The labourer who is employed as a farm hand to aid the tenant or the cultivating proprietor.

37,400. *Sir Thomas Middleton*: You have given us a number of facts as to hours, wages, etc., in your memorandum; have those facts been derived mainly from the Settlement Reports of the districts?—No, they were obtained by me as the result of intensive enquiries in different parts of India; I have travelled in every Province in India. The Settlement Reports are silent as to the hours of labour of the farm hand.

37,401. I think some of the figures you give as to serfdom were taken from the Settlement Reports?—Those with regard to Bihar were taken from the Settlement Reports, but I also made an enquiry myself some months ago in Chota Nagpur, and I found a system of serfdom still prevalent in spite of the legislation to the contrary.

37,402. You spoke of the high standard of cultivation attained in Eastern Bengal. What is that due to?—In the first place, they cultivate a money crop, jute; in the second place, agriculture in Eastern Bengal depends not merely upon the annual inundation from the Ganges but also upon the flood from the Brahmaputra, and these floods are so timed that they have two or three croppings in some districts. Lastly, the deltaic soil is very fertile.

37,403. You have favourable natural conditions and you have a money crop which brings in a large amount of money. Is not the supply of fish

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to supplement the rice crop another very obvious factor in the economic position?—Yes, fish is a very important source of wealth.

37,404. You were rather definite in the view that cycles in the weather recur?—That hypothesis is not mine; it is the hypothesis of the meteorologist, and if you have any quarrel with that hypothesis, it is not my quarrel.

37,405. I wondered whether you had used the right word; did you not mean that periods of dry weather were apt to occur over a number of years?—If these periods follow in sequence, they ought to be called cycles.

37,406. I have heard meteorologists and other scientific men discuss this at length and I think we must take it as not proven?—The recent study of African rainfall has gone to show that the rainfall in the Abyssinian plateau and in the Sudan has a definite connection with the rainfall in India, and researches made by French investigators in the Sudan and in West Africa have shown that there is a steady diminution of rainfall in the Sudan; there is a gradual aridity arising in that part of the French possessions, and as that has a very intimate connection with the monsoonal character of the Indian rainfall, we expect to have more of these dry cycles, as I am calling them, in future.

37,407. I agree that changes in the character of the weather take place?—But when these changes follow a sequence, they have to be called cycles.

37,408. How did you arrive at the number of acres cultivated per pair of bullocks?—From conversation with peasants in the different districts.

37,409. You give a very low figure, four acres for a pair of bullocks?—In parts of this Province there is such great density of population that cattle cannot be maintained in large numbers and they have to be worked as much as possible; so that there is a great difference between the number of acres that can be ploughed by a pair of cattle in the Punjab and the number in a district like Benares.

37,410. The fact that it is difficult to maintain cattle makes it all the more important that they should plough as much as they are capable of ploughing; how much should a pair of cattle be able to cultivate?—I have said four acres, but they can cultivate ten acres.

37,411. What would you suppose it would cost to keep a pair of cattle?—Now that irrigation is becoming more and more difficult as the water level is sinking more and more, there is a greater need of cattle power, and that at a time when there is no fodder, namely, in the dry season. In the dry season we want greater cattle power, and it is in that season that the cattle have much less food than in any other part of the year.

37,412. What does it cost a cultivator to maintain a pair of bullocks throughout the year? I have heard it stated that in the United Provinces it may cost Rs.200; but suppose we take it at Rs.100 (it would not be less than that). Then if the cultivator has four acres, it will cost him Rs.25 per acre to maintain his bullocks; that would mean that he would lose Rs.15 per acre on the four acres which he cultivates?—What is your point?

37,413. You made the statement that an ideal form of State landlordism would be one which would assure to the cultivator an adequate standard of living; have you ever deducted from the produce of the four acres holding the total paid in assessment, and asked whether the cultivator would then have an adequate standard of living?—No, in India it is decided quite the other way; you see there is a schedule of the expenses of cultivation. In that schedule the stock of agricultural debt is conveniently forgotten, the risks of agriculture are conveniently disregarded, the recurrence of dry cycles is also ignored, the cost of cultivation is placed on one side, the profits on the other, and then the assessment is fixed.

37,414. I was wondering whether you yourself had forgotten anything; you take the value of the four acres and deduct from that the total assessment payable on the four acres, which will be Rs.8 on four acres?—Yes.

37,415. Would the removal of the Rs.8 ensure to the cultivator an adequate subsistence if he is losing say Rs.15 on his bullocks, because he has got too small an area to cultivate? Have you compared the effect of being restricted to a very small holding as compared with the burden of the assessment which the cultivator pays?—In that part of my memorandum I do not say that it is the heavy assessment which is the greatest burden of the cultivator; my point in fixing that limit of three acres was this, that below that limit the holding ceases to maintain the family at all at the existing standard of living and comfort.

37,416. And even if he had that holding for nothing, he would not have an adequate standard of subsistence?—That is right.

37,417. *Professor Gangulee*: Has not the French author you refer to described what you speak of as weather cycles as periodicity of weather?—When periods of excess or deficiency of rainfall run in sequence, they become cycles.

37,418. I know that, but would not the facts rather suggest periodicity than a definite cycle? Hooker, as the result of his researches in England, finds periodicity of weather changes rather than definite cycles?—I do not quite follow what you mean; we have in India these cycles of heavy and deficient rainfall following in a periodic recurrence.

37,419. You are in favour of emigration, but would not emigration affect the so-called economic solidarity of the family of which you spoke?—The more adventurous sons of the cultivator would be going out to distant mines and plantations or overseas.

37,420. But would not that affect the so-called economic solidarity of the joint families?—When the money orders come to the villages the solidarity of the joint family would be all the stronger.

37,421. Is it your opinion that the number of landless agricultural labourers is increasing?—Yes, definitely.

37,422. Throughout this country?—Yes.

37,423. You have been telling us a great deal about the village panchayat and also about the village communal life; could you tell us how this village communal life could be revived?—We must give more power to the village panchayats under the Village Self-Government Acts, and a large part of the organisation of agriculture might be left to them. For instance, the whole question of consolidation might be more easy of solution if the village panchayats could be utilised in this matter.

37,424. Do you think that village panchayats are sufficiently educated to be able to take the responsibilities of modern legislation?—Yes, for these agricultural purposes; in fact they have done so in a country like Japan.

37,425. *Sir Thomas Middleton*: There is one figure given on page 394 of which I doubt the accuracy. You say: "Annual farm hands get Rs.200 to Rs.250, and in addition four *kuros* of *juar* every month in Amraoti." Is there no mistake in this figure?—No; I think it is right. This is based on what I gathered as a result of a personal visit to a particular village myself.

37,426. *The Chairman*: Are you including the conditions of marketing in your surveys?—Yes.

37,427. Do you think that there is a great deal of work to be done in that direction?—Yes; I think we have to introduce co-operative sales wherever possible.

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37,428. Do you think that detailed economic surveys in the field of marketing are necessary before you can frame your policy?—I think the data we have already are sufficient to lead us to the hope that co-operative sales would be very useful to the peasant everywhere. We have data regarding the organisation of such sales and the channels of marketing are also well known.

37,429. Have you investigated at all the margin upon which the various intermediaries in the chain of marketing and distribution operate?—Yes, we did some investigation work only a month ago in the Lucknow district and we found that 33 per cent. would represent the profits of the grain dealer in the particular village in which we investigated.

37,430. That is an investigation in one village only?—We hope to conduct similar investigations before long. It is of course in those parts of India where valuable money crops are grown that co-operative sale can prove more effective.

37,431. On this question of money crops there is one point that I would like to ask you. Would you like to say anything to the Commission as to the effect upon the economic welfare of the cultivator that the change over from food crops to money crops may have?—Where the money crop is grown as a result of the hypothecation of the grain dealer or moneylender, such a change would act unfavourably on the position of the cultivator; on the other hand, if the money crop is grown under conditions where the cultivator is still master of his own crop, then surely the money crop would be an advantage.

37,432. Assuming that the value of the money crop is greater than the value of the food crop, do you not think that it is also necessary if his lot is to be bettered that he should obtain the full cash value in the commodities that he requires?—Do you mean that the cultivator should grow food grains himself?

37,433. I mean that if he is to get the advantage of the increase brought about as a result of the change-over, plainly he must spend his money on the things of life that he desires; if he cannot obtain those things reasonably cheaply in his village, then, although he may be, on the face of things, better off in terms of cash he is not able, owing to his inability to buy well, to enjoy in the shape of commodities the advantage which he has earned?—But his labour will not be very profitable if he, for instance, continues to grow cotton in his own village garden or makes cloth out of cotton spun by his womenfolk, because he can get these things cheaper in the market.

37,434. But it is necessary, is it not, if he is to get the advantage of any improvement in his position in terms of cash, that he should be able to buy well; it is not merely a question of being able to sell his money crop well, it is also a question of his being able to spend his money to advantage? Have you studied that side of the problem?—I do not think that the cultivator is in danger of that. What we really have to do is to save him from the exploitation of the grain dealer rather than from the exploitation of the ordinary grocer or village shopkeeper.

37,435. You do not think that the one is as important as the other?—No.

37,436. Have you studied at all the price level of commodities in the ordinary Indian village?—Yes, there is a disparity between village and town prices; but that disparity cannot be compared with the enormous leakage of the profits of agriculture due to interception by the grain dealer, by the man who hypothecates the cultivator's crop.

37,437. Have you anything that you wish to say about the value of the export trade in agricultural produce to the cultivator? Do you attach importance to India's agricultural export trade?—Yes.

37,438. Have you studied the overseas markets in their relation to Indian produce?—Yes.

37,439. Is there anything in that field that you wish to put before the Commission?—I think that the cotton and jute markets abroad should be better organised than they are at present, and these should be linked to a federation of co-operative sale societies of cotton or jute which may be established.

37,440. Have you considered at all the possibility of fixing standards of quality for export?—Yes, if we can standardise our articles the market will be surer. We have to learn a great deal from the standardisation effected in Denmark, for instance.

37,441. And do you think that a raising in the estimate of the world's markets of the reputation of Indian produce would be of real service to the individual cultivator in India?—Yes.

(The witness withdrew.)

*The Commission then adjourned till 2.30 p.m. on Wednesday,
the 9th February, 1927, at Cawnpore.*

Wednesday, February 9th, 1927.

CAWNPORE.

PRESENT:

The MARQUESS OF LINLITHGOW, D.L. (*Chairman*).

Sir HENRY STAVELBY LAWRENCE, K.C.S.I., I.C.S.	Sir JAMES MACKENNA, Kt., C.I.E., I.C.S.
Sir THOMAS MIDDLETON, K.B.E., C.B.	Mr. H. CALVERT, C.I.E., I.C.S.
Rai Bahadur Sir GANGA RAM, Kt., C.I.E., M.V.O.	Professor N. GANGULEE.

Raja Sir RAMPAL SINGH (*Co-opted Member*.)

Mr. J. A. MADAN, I.C.S. } (*Joint Secretaries.*)
Mr. F. W. H. SMITH. }

Mr. F. HOWARD VICK, M.I.Mech.E., Agricultural Engineer
to Government, United Provinces.

Notes on Irrigation.

Irrigation is very necessary for successful farming in Northern India since it gets practically all its rainfall condensed into about four months of the year, from mid-June to mid-October, the remaining eight months being nearly rainless. The most important and paying crops, such as wheat, barley, gram, &c., are grown entirely, from sowing to reaping, in the dry rainless season, and these all give a very poor return unless they get irrigation water from some source. Sugarcane, too, is sown in the dry season, and, generally speaking, to get any success and profit there must be irrigation between March and June. It is in these months that the foundations for a good cane crop are laid, and unless irrigated and well started in these dry months the crop will not make good in the rainy season.

I would, therefore, place irrigation as by far the first and most important need of agriculture. It is water, water, all the time, that the ryot and farmer is crying out for. If he can get the water in sufficient quantity, he will make good and his villages will be prosperous and fertile. On the other hand, without irrigation the ryot is poor, his village a wilderness and disease and semi-starvation his lot. If an example of this contrast were required, I would point to the generally prosperous villages of Rohilkhand where irrigation is comparatively cheap and easy, and parts of Muttra and Agra districts where irrigation is difficult and costly and the villages poor, half deserted, and barren.

There is, of course, a large area of land irrigated in the United Provinces, and in many other Provinces of India, by gravity flow from the many large canal systems. But there is a distinct limit to the area commanded by such canals and very few further large schemes await development since nearly all the large rivers have been, or are in the process of being tapped.

The remaining areas not so irrigated rely either entirely on the season's rainfall to carry them through the dry months of the year or partly on rainfall and supplemented by irrigation from wells, *jhils* and streams

It is instructive to analyse the areas of the United Provinces as regards irrigation or no irrigation. The total cropped area is about 35,000,000 acres, and this can be divided into three divisions:—

1. Flow irrigated area from canals and reservoirs.
2. Lift irrigated areas from wells, *jhils*, &c.
3. Area with no irrigation.

The totals of area of these three divisions are as follows:—

Classification.	Acres.	Percentage.
1. Canal irrigated	2,450,000	7
2. Irrigated from wells, &c.	7,350,000	21
3. No irrigation	25,200,000	72
Total cropped area	35,000,000	100

We thus see that although there are many big canals in the Province, only 7 per cent. of the total cropped area is irrigated from them. Also that only a further 21 per cent. of area is irrigated from wells, *jhils*, &c., and that the enormous proportion of no less than 72 per cent. is entirely without irrigation facilities at present.

Here lies great scope for the work of the engineer, a score of millions of acres or so in one Province alone producing about one-half to one-third of the crops it could produce simply for lack of irrigation water. It seems the very urgent duty of every Provincial Government and every Department of Agriculture to make a careful survey of the possibilities for irrigation by some means, within its respective Province and then get forward with some useful work in this direction if such work is found to be economically sound.

Speaking with a very wide knowledge of lift irrigation possibilities in the United Provinces, I am sure that great developments can be made here by lift methods from wells and bore holes. I have made many thousands of borings in the Province and I know the subsoil contains an absolutely inexhaustible water supply and mostly within very easy depths for lift irrigation. We have been working on earth borings and tube wells for the past fifteen years and have very fully proved the usefulness and economic soundness of such schemes. We can turn a well yielding 1,500 gallons per hour and irrigating five or ten acres into one giving 30,000 to 40,000 gallons per hour and irrigating and protecting 150 to 250 acres, by deep borings and the installation of water-lifting machinery.

It is a very urgent necessity for this Province's agriculture that lift irrigation be adopted on a very large scale. Money invested in such schemes could bring in a good return in the way of interest and the Province would be enormously benefited and enriched. The Province could also be placed outside the danger of drought or famine after a poor season's rainfall if such lift irrigation methods were adopted on a large scale.

The problem is how these lift irrigation schemes on very extensive lines can best be tackled. Up to now, in the United Provinces, we have been catering for one class mostly, the more prosperous zamindar and land-owner who has either money to pay for his schemes or extensive lands to mortgage to Government as security for a big loan. It is very necessary to go further and help the masses of the ryots who form the bulk of the agricultural classes and cultivate so great a proportion of the land under crops in this Province.

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Since the ryot is, generally speaking, a poor man, without capital and without land to mortgage for loans, the only way to give him help in the way of irrigation would seem to be the formation of a Lift Irrigation Department on a large scale, something far bigger than even the present Canal Irrigation Departments. The schemes would be financed by Government and water sold and the money collected just as it is done in the Canal Irrigation Department. It would, perhaps, be possible to make lift irrigation a branch of canal irrigation, but there would then be the danger of neglecting and obscuring its importance. The Canal Department worked on lift irrigation by mechanical power for some years, about eighteen years ago, but failed to grasp its essential features through inexperience and imperfect knowledge of conditions existing underground and of suitable machinery for the work. Nothing was accomplished, therefore, at that time, nor until the Agricultural Department seriously took up agricultural engineering by the appointment of a permanent Agricultural Engineer in 1913.

The chief and, perhaps, the only difficulty in the way of very extensive schemes of lift irrigation is the financing of them. But there seems nothing impossible even in this, since huge sums of money are raised both in India and other parts of the world for large irrigation projects that promise a reasonable return of interest on capital. I think that Government should raise all necessary money by loans, just as they have done for new canal systems of irrigation.

Oral Evidence.

37,442. *The Chairman:* Mr. Vick, you are Agricultural Engineer to Government in the United Provinces?—Yes.

37,443. You have provided the Commission with a note of the evidence that you wish to give; would you like to add anything to your written evidence at this stage, or may we ask you one or two questions?—I do not think there is anything I wish to add.

37,444. Have you seen the memorandum provided for the Commission entitled "A Report on Agriculture in the United Provinces?"—Yes, I have seen the report prepared by this Province.

37,445. Would you give the Commission quite shortly an account of your own professional training and past appointments?—I was trained in England in mechanical engineering; I was a premium pupil with the firm of Sisson & Company, of Gloucester, and I was with them for about six years. I was also with a private firm of consulting engineers in England, Messrs Hampidge & Platt, and I came to India in 1897.

37,446. How long have you been in Government service?—I joined Government service in March 1899.

37,447. For how long have you been in charge of this particular branch of Government service?—I came permanently to the position of Agricultural Engineer in October 1913.

37,448. Would you give the Commission an account of the organisation of your sub-department in the Province; I think you have three or four circles?—The Province is divided into four circles each in charge of a Gazetted officer.

37,449. What staff has each of these Gazetted Officers at his disposal?—He has one first grade mechanic, two second grade mechanics, and as many fitters as there is work for; but actually the Government establishment is one mechanic first grade and two mechanics second grade; those are on the establishment; fitters are not on the establishment; they are paid for by the owners of wells.

37,450. These Circle staffs are augmented or diminished according to the amount of work to be done at any time?—Yes, they are.

37,451. What can each Circle undertake in terms of tube wells; how many tube wells could be constructed at the same time in each Circle by the same staff?—About twenty at a time in each Circle.

37,452. I think you are entirely separate from the Irrigation Department; you are part of the Agricultural Department?—Yes; I am a specialist officer of the Agricultural Department; I am not in the Agricultural Service.

37,453. But your budget is part of the agricultural budget?—Yes.

37,454. In your view is that a sound arrangement which divides canal irrigation from well irrigation?—No, it is not.

37,455. Would you like to see a change made?—In this Province, lift irrigation, if properly developed, will get too big for management by the Agricultural Department.

37,456. What do you suggest ought to be done?—It seems to me they ought to be combined now. I have got 126 tube wells in hand at the present moment of a value of about Rs. 10,00,000.

37,457. What exactly do you suggest: that your department should be linked to the Irrigation Department?—It is rather a difficult point to answer suddenly; it requires consideration.

37,458. Perhaps if you have not considered it before you would rather not answer now?—No. I should be quite willing to consider it and give you a further note on the point.

37,459. Yes, I think we should like to have a note and to have the argument which leads you to the particular view to which you come. There is a considerable disparity between the figures that you give on page 3 of your note as typed to show the percentage of land irrigated by canal, by wells, and land not irrigated at all; you say 2,450,000 acres are canal irrigated, while the figure mentioned in the memorandum is about 3,000,000?—It may be that some land is irrigated twice, and in reckoning the total irrigation done and the water rates collected some land might come in more than once.

37,460. That 3,000,000 itself does not include the 1,500,000 to 2,000,000 acres which it is estimated will be irrigated by the canals at present under construction?—No, it does not include that.

37,461. Is there any overlap between the canal irrigation and the irrigation from wells; is certain land commanded by canals also irrigated by wells?—Yes, very much so; in Meerut District for instance. As I say in my note, about 40 per cent. of a village is as a rule the maximum irrigated from canals, and I frequently put down tube wells in villages which are canal irrigated.

37,462. Does that show that the canal system is not capable of providing the cultivators with all the water that they require at all seasons of the year?—Not necessarily; it might be that the land is too high to be commanded by the canal to get the gravity flow; the higher land in the village might not be canal irrigated and it might require a tube well.

37,463. In some areas, where land is commanded by canal, water is not always available to the cultivator at all times of the year?—No.

37,464. And in such cases you have constructed tube wells to supplement the canal carried water?—Yes, I have.

37,465. I want a statement of the extent to which the Provincial Government is in fact subsidising the construction of tube wells. It has been stated before the Commission by other witnesses that in fact State assistance is provided in two forms: service free of charge, and in cases where the land irrigated by tube wells is to be used as an approved seed farm or for demonstration, there is I think a further subsidy in cash?—Yes.

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37,466. Can you clear that up for us and tell us how the matter stands?—What is known as the grant-in-aid is usually Rs.2,000, if we want to cover a small plot for demonstration purposes.

37,467. That is Rs.2,000 given in cash for one well?—Yes, it is occasionally Rs.3,000; we will say it is Rs.2,000 to Rs.3,000.

37,468. And that is given after the agreement about the demonstration side of the work is signed?—Yes, there is an agreement for a demonstration plot or else for giving us seed; in some cases they give us seed.

37,469. Can you tell us to what percentage of the total wells sunk by your department this grant of Rs.2,000 to Rs.3,000 in cash applies?—Quite a small proportion; I should say 10 per cent.

37,470. Then quite apart from that, I think there is also a certain amount of help given in advice and service free of charge?—Yes, the whole of the staff are paid by Government from establishment, and that is not charged to the owners of the tube wells.

37,471. So that they get the technical advice and they get the actual work?—Yes.

37,472. And what does the cultivator pay for the material?—They pay for all the material, the engines, pipes and things used on the tube well.

37,473. And I presume they cart the material themselves?—Yes, generally they will then cart the material about.

37,474. Who pays for the unskilled labour?—They pay for it.

37,475. "They" being the cultivators?—The zamindar, the owner of the tube wells pays for the unskilled labour.

37,476. And that applies to every well constructed?—Yes.

37,477. Do you estimate at all what that assistance is worth in cash?—I have estimated that the cost of a big tube well with a 6 inch pump delivering 40,000 to 50,000 gallons an hour, at Rs.14,000, of which the zamindar pays about Rs.8,000; it is subsidised to the extent of about Rs.6,000.

37,478. Apart from that, zamindars may of course get indirect assistance in the shape of cheap interest on money through the *taccavi* loans?—I cannot say it is low interest; it is $7\frac{1}{2}$ per cent.

37,479. That is not low interest, but I notice that Mr. Clarke in his note of evidence talks about assistance in the form of *taccavi* and grants-in-aid, the latter being I suppose the Rs.2,000 to Rs.3,000 grants?—Yes.

37,480. Do you think the zamindar could get his money cheaper elsewhere?—No, decidedly not.

37,481. Would he get it as cheaply from any other sources?—I think not.

37,482. So that, although it cannot be called cheap money, it is of assistance to the zamindar?—Yes.

37,483. Can you tell me if it is the case with these arrangements that you have been describing, that while they make it possible for substantial zamindars to construct tube wells, they hardly ever bring a well within the reach of the smaller men?—Yes, that is the case; we are working for the rich man.

37,484. I think I understand from your note that it is your suggestion that, until such time as the small man by combining with his neighbours is in a position financially to finance tube wells, Government should undertake the work, should sink tube wells in sets so as to cheapen pumping and should sell the water to the cultivator just as the Irrigation Department sells water carried by canals?—That seems the only way of solving the difficulty and getting at the small man.

37,485. That might even be the first stage to the ultimate taking over of the work by co-operative organisations?—Yes, provided the co-operative societies develop to any extent; at present they are weak.

37,486. Have you worked out at all the sort of area that you might irrigate by some such scheme as that which you have suggested, which is not likely to be irrigated under the present arrangements?—Yes, 75 per cent. of the Province is not irrigated at all and quite a large portion of it could be watered by lift irrigation.

37,487. You have got some 72 per cent. of the land of the Province which is not irrigated according to your figures, but I presume some of that will probably be irrigated as a result of your present arrangements, without Government undertaking any new responsibilities?—Yes, except that the scale on which we are now working is very small in proportion to the area of the Province.

37,488. What percentage of that 72 per cent. do you think is capable of being irrigated from tube wells?—Taking a rough figure I should put it at half.

37,489. Do you think that Government could recover in the shape of charges for the water the cost of constructing these tube wells?—I see no difficulty in that because the cultivator pays for the canal water at present; it would certainly be at a rather higher scale but I see no difficulty in it at all.

37,490. Do you think that the economics of tube well irrigation have been sufficiently studied in this Province or elsewhere in India?—No; there has not been any deep study into it.

37,491. I suppose the ideal conditions for such study would be at places where Government demonstration farms are irrigated from tube wells?—Yes, it would be a good opportunity for studying it. I have not got the staff myself for placing men on special work like that. Apart from the Government farm we are also working for the zamindar, and once the tube well is constructed we hand it over to the zamindar himself who provides his own driver, so that we have nothing further to do with it unless he gets into difficulties and he calls us up to set things right.

37,492. The Commission has been told that well water can only pay if the cultivation that it waters is of a high order and usually if the more valuable crops are irrigated? Would you agree with that?—Yes.

37,493. So that probably before Government undertake any large scheme you would suggest a very careful assessing of the costings of agriculture irrigated by water from wells?—Yes.

37,494. In the meantime is it the case that nothing of that sort is being carried out, at any rate by your department?—Yes, practically nothing.

37,495. *Professor Gangulee*: Not even in the case of the pumps that you have in the Government farms?—No; I can tell you what it would cost to lift the water and deliver it on the land or anything like that.

37,496. *Sir Ganga Ram*: We will divide this question into three heads: first, you bore wells in order to increase the output of water?—Yes.

37,497. Is that under you?—Yes.

37,498. From Mr. Clarke's evidence I gather that altogether you have done up to this time 38,056 feet in 673 wells and the cost has been Rs.2 per foot. What were the maximum and the minimum depths of boring that you did?—The maximum was 100 and the minimum 30 possibly. I think this average is probably quite right. But your figures are those for one year only. Altogether we have done more than 25,000 borings with a total of more than a million feet.

37,499. What size of tube did you put in?—2½ inch and some 4 inch.

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37,500. What did you put at the bottom?—Nothing at all; they are open pipes.

37,501. Did you put any bell mouths?—No.

37,502. Do you not think that that method interferes with the velocity of the water coming in?—There is no velocity practically in a well where *charsa* working is done.

37,503. Do you not put concrete underneath?—No.

37,504. Do you put a strainer underneath?—Not in most cases.

37,505. Are these pipes of cast iron or wrought iron?—They are steel pipes I should say.

37,506. Do they work all right in these soils?—Yes.

37,507. Have you ever thought of the scheme of advising people to put *buchhas* or baby wells into the bigger ones; for instance if a well is ten feet, you can put in a seven feet well. That is how we do it in the Punjab?—We do not need that so much in this Province.

37,508. You are probably working entirely on sand; in certain parts of the Province we get similar conditions. Has that been tried in this Province?—Yes, the cultivators themselves are doing it on their own fields.

37,509. So much about boring wells: I now come to the ordinary wells. In the ordinary wells do you advise them where to stop? Do they come to you for advice?—Yes, we make test borings for ordinary *pucca* wells and we give them a sketch showing how deep they should sink their well cylinder.

37,510. You do not charge for that?—No.

37,511. With regard to tube-wells: how many kinds of tube-wells are there and what are their sizes? Is the least size two inches and a half?—Two inches.

37,512. And the next?—Four, five, seven, and nine inches.

37,513. Are these the only five sizes that you use here?—Yes; but we use the 2½ inches for *pucca* wells, for *charsa* working only.

37,514. That is the size of the strainer, and not the boring?—The boring of course would naturally be bigger. My standard boring for the big nine inch strainer is 15 inches; and the standard size in casing and boring pipes varies from 15 to 12, 8, 5 and 4. The strainer work is of course subsidised by the Government to a certain extent. I make my own strainers.

37,515. What strainers do you use?—Strainers of my own design.

37,516. You do not use the Brownlie strainer?—No. I do not use Brownlie strainers at all.

37,517. Have you invented one yourself?—I have designed one and am making that.

37,518. Is it your patent?—No, I have not patented it. At one time I used the Brownlie strainer.

37,519. I only know of three types: Brownlie's, Ashford's, and a new type now being made in Lahore?—There are at least fifty types; the United States are full of them.

37,520. Which of those in use here do you consider the best?—My own.

37,521. We have never heard of it in the Punjab?—You are coming to my workshops to-morrow, and can see it under manufacture.

37,522. Is it a copper strainer?—Yes.

37,523. What is the cost for each size of tube-well, using your own type?—For 2½-inch, Rs.5 per foot; for 4-inch, Rs.7 per foot; for 5-inch, Rs.9.8.0 per foot; for 7-inch, Rs.13 per foot, and for 9-inch, Rs.15 per foot.

37,524. Can you tell me the discharge from each?—That depends on the number of feet you put in the ground.

37,525. And also on the coarse sand you encounter?—Yes. With a 9-inch type, I am getting up to 60,000 gallons per hour, and occasionally up to 70,000 in certain cases.

37,526. When dealing with irrigation it is better to give the figures in cusecs?—For the big strainer the average would be 40,000 gallons an hour, or nearly two cusecs.

37,527. What would be the figure for the smallest?—The 2½-inch strainer is only used for bullock working; the others are chiefly used with power pumps. The maximum discharge would be, with the 2½-inch strainer, 4,000 gallons per hour.

37,528. And for the other sizes?—With the 4-inch, 10,000 to 12,000; with the 5-inch, about 16,000, and with the 7-inch, 25,000.

37,529. Who passes your estimates, the Director of Agriculture or the Minister?—Neither; neither is capable of scrutinising my estimates for technical work.

37,530. If you were linked to the Irrigation Department, there might be someone there who could check your estimates. Do you construct these things in your workshops or outside?—I do most of the work in my own workshop.

37,531. Is there a separate budget for your workshop?—Yes.

37,532. Do you show a profit?—No; I have been told by Government not to try to make a profit, but to help the zamindars.

37,533. Do you think an outside company could make them cheaper?—No.

37,534. I understand there is a company here which is making tube-wells?—They have attempted to.

37,535. Have they failed?—Yes, they have closed down that branch of their work. They had many failures; they never had anyone who understood the work.

37,536. I thought you were giving them advice?—They asked Government if I could join them, and Government refused. They approached Government without consulting me.

37,537. How many tube-wells have you sunk altogether?—We have made just over 25,000 borings for improving wells.

37,538. How many acres do you expect each size to irrigate?—The well with a 9-inch strainer is for a farm of 120 to 150 acres.

37,539. To make up for want of rainfall only?—No, it is for *rabi* irrigation; for sowing and continuing right through the *rabi*.

37,540. How many waterings?—The average is probably three for wheat and eight for sugarcane.

37,541. What is the cost per acre of supplying this water from tube-wells?—The actual running cost depends on the lift. With an average lift of 30 feet it would cost about Rs.2 per acre per watering.

37,542. For *rabi* it would be Rs.8 per acre?—Yes.

37,543. *Mr. Calvert*: Does that include interest and depreciation?—No; I was asked for the running costs.

37,544. *Sir Ganga Ram*: You put the running costs at Rs.8 per acre per *rabi*?—Yes.

37,545. Do you think the zamindars would pay that if you gave them water from tube-wells?—Certainly.

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37,546. How much would you add for interest and depreciation? Another Rs. 2?—About that.

37,547. You advocate the creation of a Lift Department. Would you advise Government to undertake the work of supplying water from wells at Rs.10 per acre for rabi?—It could be done where the lift was easy. I am taking a 30-foot lift. The water would never be wholly for rabi but for sugarcane as well as rabi.

37,548. That will be about the maximum?—It is not easy to give a figure for a big thing like a Lift Irrigation Department.

37,549. The question is whether we should propose that these wells should be sunk and worked on a co-operative basis?—I think that should be done.

37,550. You say 75 per cent. of the land is not irrigated. According to evidence we have had before us as to the rate of progress now being made, it will take 400 years to bring this area up to the minimum required for obviating any risk of scarcity. What other means have you thought of for doing this?—Have you thought of any big canal scheme? According to my calculations, 10,000,000 acres must be brought under irrigation before this Province will be protected from famine?—I have never drawn up any big scheme, but from my tours round the Province I know there are many rivers and large hills from which we could pump.

37,551. Has anything been done in that direction?—No, because there has not happened to be a zamindar in that area who could pay for the plant.

37,552. I am certain if you offered to supply them with water at Rs.10 an acre they would be only too glad to pay that?—Yes.

37,553. Is there no lift irrigation from canals here?—Very little; none by mechanical power. There are small areas irrigated by basket lift, and so on.

37,554. Do you not have a sort of Persian wheel for lifting?—Yes, but only to a very limited extent.

37,555. Do not the zamindars apply for that sort of thing?—The Irrigation Department has a lower rate for lift irrigation than that for flow irrigation.

37,556. But it is not taken up?—Not on any scale.

37,557. Because there is very little water in those months?—That is so.

37,558. Are you and the Agricultural Department under the same Minister?—Yes.

37,559. You only give canal water up to 40 per cent. of the area?—A village is supposed to be fully protected when 40 per cent. of the village area is given water.

37,560. But even that is not given?—Often it is not. It depends on the levels in the village.

37,561. Is there enough water to give it?—No.

37,562. Have you thought of any new schemes of increasing the canal water?—No.

37,563. Has the Irrigation Department not thought of any schemes for that purpose?—I do not think so. The Sarda Canal is probably the last of the big schemes in this Province.

37,564. But I want to know how you are going to get over the difficulty of dealing with 10 million acres which you want to irrigate in this Province?—It is only a question of finance. You can put in as many tube-wells as you want, provided money is found for them and their construction is economically sound.

37,565. That will not be a paying proposition. A tube-well on the average will command on the average only 10 acres, is it not?—It will command 250 acres.

37,566. With what size?—With 15-inch size boring and 9-inch strainer.

37,567. Of course, with that size it should command 800 acres according to our calculation. We give three cusecs per thousand acres out of which 500 acres are *rabi*?—It is all a question whether the man is using the water to the full advantage.

37,568. But if there is a scheme, a successful scheme, they will pay even Rs.10 an acre; the zamindars will pay double the rate of the Canal Department?—Yes; they will pay.

37,569. You have not thought of pumping a group of wells by compressed air?—No, because it is so inefficient. It is one of the most inefficient lifts in the world.

37,570. Have you tried it?—I know it; I have tested it. Thirty per cent. is about the maximum efficiency.

37,571. I know it is going to be made a paying proposition, because that is the only thing which can be done on a co-operative basis. Now we saw a tube-well in Benares and we were told it cost Rs.30,000; is that right?—The strainer that was first put in collapsed.

37,572. So it is the fault of the strainer?—Yes. It was a Brownlie strainer.

37,573. Is it a fact that it cost Rs.30,000?—I could not tell you off-hand; but it has been done twice.

37,574. I asked the driver there and he told me that the discharge was 15,000 gallons per hour?—It was 16,900 actually by measurement.

37,575. At that time it was not giving more than 5,000 gallons. It was commanding only 64 acres of land. Did you not think of a well of proper size which would be sufficient to irrigate that area?—The difficulty is that boring with a small size pipe is of no use. Benares is one of the worst places in the Province for tube-wells.

37,576. Have you got a section of that ground?—Yes; we passed a hundred feet of hard clay before we touched the water. (*The section was shown to the Commission.*)

37,577. You passed through very little of coarse sand?—Yes; it is a very bad place for boring.

37,578. Do you not bore first and then consider whether it is a proper place or not?—We do, of course.

37,579. *Professor Gangulee*: Have you trial borings?—No; I have given up trial borings because I know more or less the conditions in most of the tracts.

37,580. *Sir Thomas Middleton*: Could you tell us in a broad way for which areas in the United Provinces tube-wells are especially suited? You have mentioned Benares as an unsuitable area?—In a broad way the north of the Ganges is suitable and the south of the Ganges is poor.

37,581. Have you worked south of the Jumna at all, near Jhansi, for example?—No.

37,582. Why do you find the north of the Ganges suitable; is it because of the relatively small depth of clay through which you have to bore and the depth of sand which you can tap?—Yes, it is.

37,583. Do you find that there are large tracts in which the depth of the water is approximately uniform or does the depth vary much from village to village?—You find large tracts where the depths do not vary.

37,584. So that the water occurs in large basins in the sand through which you are boring?—The whole of the Province is one huge bed of sand with a certain number of floating beds of clay.

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37,585. How deep have you bored?—The deepest boring I have seen made in this Province was 1,100 feet.

37,586. And you find sand right through?—Nothing but sand right down to the bottom, and I have heard it said by the Geological Department that probably the depth of the basin is four or five miles.

37,587. There is nothing of the artesian conditions here?—No; you could not get it under those conditions.

37,588. It is purely soakage?—Absolutely, yes.

37,589. Have your tube-wells generally been made in the cane-growing districts?—Yes.

37,590. Next to cane, which is the crop that has called for a tube-well by the zamindar?—The rotation crops with sugarcane, such as wheat and gram; but I do not think there are any tube-wells put down where there is no cane area at all.

37,591. You have no other sufficiently valuable crop to tempt the zamindar to ask for a tube-well?—No; because if he could get the tube-well he would at once grow cane. There are very few parts of the Province where he cannot grow cane if he can get the water.

37,592. In what areas is the growing of vegetables chiefly practised?—In areas close to the towns.

37,593. And close to the river beds?—Yes.

37,594. Wheat comes in as being a crop that is grown alongside cane?—Yes, as a rotation crop.

37,595. Can you tell us anything about the quality of the well water as compared with canal water? If a villager has his choice which would he prefer?—There is naturally more lime in well water than in canal water.

37,596. Is the difference known to the villager and is he anxious to have well water in preference to canal water?—No, because the canal water is cheaper and he will go in for the cheaper water if he can get it.

37,597. Is there much tobacco grown in the Province?—Not a great amount, but it is grown on patches of land near the village where it can be heavily manured.

37,597A. And irrigated by well water?—Yes.

37,598. Is there any district in which you have heard of water causing land to go salt?—Yes; Muttra and Agra probably. But it is mostly canal water, not well water, which causes these salts to appear in the top soil.

37,599. Can you distinguish between the danger from the water which comes from the shallow well and water which comes from the deep well?—The deeper the well the harder would the water generally be.

37,600. Have you any brackish wells in the Province?—Yes; in Agra and Muttra districts there are a lot. I have sometimes made borings in brackish wells and have struck a sweet spring down below and got sweet water. I have done that many times.

37,601. Have you heard of complaints about the quality of brackish shallow wells in your work?—No; I have never heard of complaints about the water.

37,602. *Sir Ganga Ram*: Do you not get different kinds of water, first brackish and then sweet?—Yes.

37,603. *Sir Thomas Middleton*: I should think that would be one of the main reasons for asking for tube-wells; if the surface wells are brackish, would not the villagers ask for tube-wells in order to get sweet water?—I should not think 5 per cent. of the wells in this Province are brackish.

Then it is not a serious problem with you.

37,604. *Sir James MacKenna*: Do you think the Agricultural Engineer should be a member of the Indian Agricultural Service, of the Irrigation

Department, of the Public Works Department, or of a separate service?—There are not enough Agricultural Engineers to make a separate service at present.

37,605. Under what section of the administration do you think you should come?—As long as we work under the Agricultural Department we should be in the Indian Agricultural Service.

37,606. On the same footing as members of the service in other branches?—Yes, we should be, provided we have the requisite training.

37,607. What training do you think is the most suitable for an engineer devoting his time to agricultural engineering?—It is very practical work; a great deal of it has to do with the erection of machinery, and I should say they should have college education and at least two or three years' practical workshop experience.

37,608. Should they hold the degree of B.Sc. in civil engineering or mechanical engineering?—They should hold the B.Sc. in engineering, provided they had two or three years at least in the workshop.

37,609. That is the sort of man you would recruit?—Yes.

37,610. *Professor Gangulee*: Is your section of the department concerned with the problem of agricultural implements such as ploughs and harrows?—No, agricultural implements of that kind are mostly dealt with by Deputy Directors. I make a lot in my workshops for the Deputy Directors, but I do not recommend any particular plough to the cultivator; I leave that to the Deputy Directors.

37,611. Does the Deputy Director design the implements?—No, generally they are not designed by the Deputy Director. The Meston plough was designed in my workshops, but before I joined the Department. The Meston plough is very cheap, and that is the implement which we sell mostly.

37,612. Who is responsible for the improved ploughs and improved machineries about which we hear so much? I was wondering whether the Agricultural Engineering Department has anything to do with agricultural implements?—The Meston plough was designed and made by a *mistri* of the engineering workshop, I believe. I do not know of any other plough or implement made by the Department in quantity.

37,613. Is it done by the Deputy Director in your workshop?—I make some tools and implements for them, but they get a lot of implements and machines from private firms. I probably make quite a small proportion of what they sell.

37,614. Do they obtain supplies of implements from the manufacturers?—Yes, they sell quite a lot of Ransome's small ploughs.

37,615. There is no indigenous manufacture here?—I do not think there is in this Province.

37,616. So, you are chiefly concerned with the pumps and tube wells?—Yes, anything to do with mechanical power; I leave the recommending of smaller implements to the Deputy Directors.

37,617. You tell us in your statement that 21 per cent. of the total acreage is under irrigation from wells. Could you tell us what is the percentage for tube wells?—I could not tell you, but it is very, very small; we are only touching the fringe even on the scale on which we are working now. It is something far less than 1 per cent.

37,618. We are told there is a tendency for the area under well irrigation to diminish; is that so?—I could not give you a definite answer to that.

37,619. You tell us you have got 200 tube wells with engines and pumps complete and that you have 55 more in course of construction; how many of those 200 tube wells belong to the Government and how many to the people, the zamindars and so on?—I should think about 5 per cent. belong to the Government and the rest to zamindars.

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37,620. The percentage belonging to the zamindars is as high as that, is it?—Yes, it is only on a few Government demonstration farms that we have tube wells belonging to Government; practically all the work I do I am doing for the private individual, the zamindar.

37,621. When you say orders are continually coming in, you are referring to orders from the zamindars?—Yes.

37,622. Do you require any advance of the price when you take the order?—I take the whole price in advance; I do not start a well until I have the whole of the money in my hands.

37,623. Then how long does it take you to execute the order for which you have already realised the price?—It depends upon the difficulty of the boring; some borings are very much more difficult than others; in some cases it will take a year or eighteen months, if we encounter great difficulties and have a broken pipe. There is a very great wear and tear on boring tools. My staff is comparatively small at present in view of the increase in the work.

37,624. So that in order to meet the demand which your figures indicate, you require more staff?—Yes.

37,625. How many unsuccessful borings have you had?—It is a very small percentage in this Province; conditions are probably better in this Province than in any other Province in India.

37,626. Have you worked out the economical pumping unit?—You may take it in this way, that the bigger the pumping unit the less the cost will be for irrigation per unit area; you get cheaper water from a big unit than from a small one.

37,627. From your statement as well as from the provincial memorandum I have the impression that you have succeeded in making tube wells quite popular in this Province?—Yes.

37,628. How is it, then, that your success in the construction of tube wells has not led commercial firms to take it up on a commercial basis; if it is paying and the orders are pouring in from the zamindars, why do not commercial firms take it up?—But, as I pointed out to the Chairman, it is subsidised by Government; the zamindar is not going to pay Rs.14,000 to a private firm while he can get it for Rs.8,000 and have a subsidy of Rs.6,000 from Government.

37,629. So that if you removed the subsidy the popularity might cease?—Yes, it would for a time until they began to see that it might even pay them at the price of Rs.14,000.

37,630. How long do you think this subsidy will have to be continued? Surely Government is not in a position to subsidise the landlords eternally?—That is a point for Government to decide; I should not like to speak on the point.

37,631. How long do you think it would take before the commercial firms may be in a position to take it up?—I should not like to answer the question.

37,632. Do you know any commercial firm who have undertaken this work?—Yes, the Empire Engineering Company used to do tube wells a little while ago, but I believe they have given it up because they could not get any success.

37,633. Do you attribute their failure principally to the fact that they could not get orders from the zamindars?—No, not altogether due to that; it was because they made so many failures.

37,634. It was due to lack of efficiency?—Yes.

37,635. Given the necessary efficiency, do you think any private commercial firm could make it a success?—Government would have to subsidise it at first, and then gradually reduce the subsidy until it disappeared; that is the only way.

37,636. Are you reducing your subsidy now?—No.

37,637. *Mr. Calvert*: With regard to this question of the subsoil water being inexhaustible, you have, of course, heard of the theory that there is a buried mountain range parallel with the Himalayas which runs through this Province?—Yes, I have heard that opinion expressed.

37,638. That mountain range is supposed to have led to a decline in the water level in certain tracts of the Punjab?—Yes.

37,639. Do you come across any traces of a similar phenomenon here?—No, the water level in this Province has generally gone up by about 10 feet in the last six years.

37,640. There are no complaints of the water level dropping?—No, the water level has gone up 10 feet in the last six years.

37,641. So that as far as that is concerned, you do not anticipate any obstacle to the extension of these tube wells?—I see absolutely no limit to it.

37,642. Could you give an all-in figure of the cost of one of these 9-inch strainer tube wells?—Rs.8,000 to Rs.8,500; that is without the subsidy of Government; the actual cost is Rs.14,000.

37,643. And that with a 30-feet lift would irrigate about 150 acres?—Yes, and protect 250.

37,644. I think you told Sir Ganga Ram that these tube wells were mainly intended for *rabi* irrigation; but must not they be worked all the year round to make them really economical?—We get such a good rainfall that we do not want them in the *kharif* except once in ten to fifteen years when there is a failure of the rains.

37,645. That throws all your capital charges on to the *rabi* irrigation?—Yes.

37,646. For ordinary bullock well irrigation in this Province would you say the cost was round about Rs.20 an acre?—No, it does not cost that.

37,647. What is the capital cost *plus* the recurring cost?—I should imagine that Rs.15 would be an outside figure for it. You must know that we have got very easy lifts in quite a large proportion of the Province; in some cases the water is not more than 10 feet down.

37,648. I want to get the comparative costs of irrigation by the tube well and the ordinary bullock well. At what point does a tube well become economic in preference to a bullock well?—The tube well is more economical at any point up to 50 feet, provided there is sufficient area for irrigation; after that they are both uneconomic. 50 feet is the outside limit; it then begins to get past the economic line for pumping for ordinary *rabi* crops.

37,649. Up to 50 feet the tube well is more economical than the bullock power well at every level?—Yes.

37,650. Provided you have sufficient area to employ your power plant for a certain number of months a year?—Yes.

37,651. In your estimate for the costs of tube well irrigation you did not take into consideration any enhancement of land revenue on the wet land, did you?—Land revenue is a subject into which I have not gone deeply; but, of course, the only way to get increased revenue would be at re-settlements; it could not be changed at any other time.

37,652. On canal lands Government gets a water rate, and then it gets a wet assessment?—Yes.

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37,653. In your calculations as to the cost of tube wells you have not reckoned the advantage to be gained in the enhanced land revenue?—No, I have not reckoned that in; I have reckoned the actual cost of the tube well. Of course, there is something coming back to Government in the way of revenue and increased re-settlements on a village becoming irrigated instead of unirrigated.

37,654. You are rather inclined to recommend a big department which would sink these tube wells and recoup itself from a water rate?—That is done by the Irrigation branch. The capital cost is given by Government provided they get a reasonable interest on the capital cost by the working of the canals.

37,655. Have you made any calculations as to the advantage of tube wells sunk by Government under the system which you recommend and those sunk by a cultivator at his own expense, because in the second case he gets the remission of the wet assessment for the full period of settlement, say, 30 years? In a parallel case in the Punjab the calculations which were worked out showed that it would not pay the cultivator for Government to bear the whole of the initial expenditure?—Conditions are much easier in this Province than they are in the Punjab.

37,656. *Sir Henry Lawrence*: In what way?—Our water level is often in large tracts between 10 and 20 feet, and I think *Sir Ganga Ram* said that a lot of the Punjab level was 50 to 70 feet.

37,657. *Mr. Calvert*: Is the big central power station referred to in the printed note approaching completion?—Eight of the ten tube wells are being completed.

37,658. And, so far, there has been no hitch of any kind?—No.

37,659. And it promises to be quite successful financially?—Yes.

37,660. *Sir Henry Lawrence*: You said just now that the zamindar would have to pay some income tax if he used the tube well?—I only said that if he uses the tube well and he makes a bigger profit on sugar making and selling, naturally he would have to pay more income tax. As a matter of fact, in all my sugar areas I put down crushing mills for crushing the cane and boiling plant and centrifugal machines for making white sugar; in fact, the tube wells cover flour mills and oil mills and other plant besides the pump which is worked by the same engine. So that we are introducing industries as well as irrigation.

37,661. The income tax would be on his industrial revenues and not on his agricultural revenues, I take it?—Yes, that is so.

37,662. *Sir Ganga Ram*: Are all the tube wells made by you or are they made by any contractor companies here? In the Punjab there are no less than five or six firms who do this work?—I believe there is a company which was recently started under the name of "The Agra Tube Well Company," and there is also another company in Meerut who call themselves "The Reliable Water Company."

37,663. Do they have to take your permission before they undertake to put up any tube wells?—No.

37,664. They can do the work independently?—Yes.

37,665. Have you ever called for tenders from any of the Punjab contractors for the cost of putting up a tube well?—I have given actual orders for some of my tube wells to the Empire Engineering Company. We have never called for tenders from any Punjab firms.

37,666. Then, for your information only, I might mention that we are doing the work for just half the cost mentioned by you just now?—What are you reckoning on?

37,667. I have completed two tube wells very recently in my Province: the 5-inch one cost me Rs.8,000 and the 4-inch one cost me Rs.3,000. We went about 200 feet below the ground level?—If the 5-inch one cost you Rs.8,000, my price for the same is Rs.5,000.

37,668. I am afraid I must have misunderstood you?—Yes, you have: my outside price with the Government subsidy and everything else is Rs.14,000 with the big size, 15-inch boring and a 9-inch strainer.

37,669. What did you say your 2½-inch tube well cost you?—About Rs.1,000.

37,670. And the 4-inch?—About Rs.2,000, because it gets an engine with it. All my prices include engine, machinery, etc., handed over complete and running.

37,671. But excluding the engine what would be the cost?—It would cost about Rs.4,000 for the 9-inch size.

37,672. That does not include any subsidy?—No.

37,673. How much for the 7-inch size?—For the 7-inch size the cost would be about Rs.3,000, without the engine and the pump.

37,674. And for the 5-inch?—Rs.1,500. As I say, all the prices I gave before were reckoned on complete tube wells, pumpings, engine, all finished off and handed over.

37,675. When you start these tube wells, how much does the water go down? What is the head you reckon upon?—You mean what is the depression on the pumping? It is about 20 feet. I usually work on that basis.

37,676. Are you still using centrifugal pans for whitening the sugar; I thought that had proved a failure?—Not a bit of it; I was in a village the other day, which I believe the Commission will be visiting, and I found twelve centrifugal machines being used there alone for making white sugar.

37,677. From *rabi*?—Yes.

37,678. *Sir Thomas Middleton*: It would help us very much if you could give us some estimates for particular conditions which I will indicate? If you take the average conditions of the district in which you are going to bore, and assume that we have (1) a small unit of 20 acres, growing 5 acres of sugarcane; (2) a large unit of 200 acres, growing 50 acres of sugarcane; and (3) lifts of 20, 30 and 40 feet, we would like you to estimate the cost of delivering water?—Per thousand gallons or per unit area, or what?

37,679. I have given you the units so that you may estimate the quantity of water that would be required for 5 acres of sugarcane with 15 acres of *rabi* in this district?—Very well; would you like to know the cost of delivering water in each case?

37,680. Yes; also your cost of installation and your estimate of the cost of supplying the water. You might specify the conditions which you have shown us in your drawings, (1) a very favourable set of conditions for a well, (2) unfavourable conditions, state also the depth to which you assume you will have to bore?—Very well.

37,681. *The Chairman*: Can you give us any indication of the saving effected by grouping wells under one prime mover?—It would be rather difficult to give an estimate of that. It is an engineering point that the bigger the unit the cheaper would be the power per H.P. hour, and I am not quite sure on that point that by working on a 100 horse-power unit lifting water at a certain depth, we would be getting water far more cheaply than by working on 10, 15 or 20 horse-power set at the same depths. But I can work it out for you at any particular head?

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37,682. Do please? Would 30 per cent. be a reasonable estimate, do you think?—I think it would be.

37,683. Have you the time and the staff to make any investigations into the other branches of agricultural engineering?—What particular phase of the Agricultural Department work are you referring to?

37,684. How wide is your responsibility in the engineering line of your department? Can you devote attention to experiments with agricultural implements?—Yes, if there was a call for them. I should probably have to engage extra staff, but that would not be a difficulty, since Government is very liberal in the matter of funds and staff.

37,685. You think it is a reasonable arrangement that that work should come under the officer in charge of the engineering section?—Yes, I think it should be under him.

37,686. *Sir Ganga Ram*: Do you find your copper strainers suffer from galvanic action?—No, not to the same extent as they do in the Punjab. Probably the Punjab water sets up more galvanic action than ours.

37,687. For how long have the oldest of yours been working?—About twelve years.

37,688. They show no sign^t of corrosion?—No, although I have had one case where corrosion occurred after three years.

37,689. Is not sand blown in?—Yes, once corrosion takes place sand is blown in and spoils the well.

37,690. *Professor Gangulee*: Did you say there was no call at present for experiments with agricultural implements?—No, I did not say anything so broad as that; my point was, there was no call for the implements themselves from the zamindars.

(The witness withdrew.)

The Commission then adjourned till 2.30 p.m. on Thursday, the 10th February, 1927.

Thursday, February 10th, 1927.

CAWNPORE.

PRESENT:

The MARQUESS OF LINLITHGOW, D.L. (*Chairman*).

Sir HENRY STAVELEY LAWRENCE,
K.C.S.I., I.C.S.

Sir THOMAS MIDDLETON, K.B.E.,
C.B.

Rai Bahadur Sir GANGA RAM, Kt.,
C.I.E., M.V.O.

Sir JAMES MACKENNA, Kt., O.I.E.,
I.C.S.

Mr. H. CALVERT, C.I.E., I.C.S.

Professor N. GANGULEE.

Mr. B. S. KAMAT.

Raja Sir RAMPAL SINGH (*Co-opted Member*).

Mr. J. A. MADAN, I.C.S. } (*Joint Secretaries*).
Mr. F. W. H. SMITH }

Mr. C. H. PARR, B.Sc., I.A.S., Deputy Director of Agriculture,
in charge of cattle breeding operations, United Provinces.

Replies to the Questionnaire.

QUESTION 16 (a) (i).—ANIMAL HUSBANDRY.—For the purpose of considering the breeds and types of cattle the United Provinces may be conveniently divided into five tracts, viz.:—

- (1) Dry Western tract.
- (2) The Submontane tract.
- (3) The Central humid tract.
- (4) Bundelkhand.
- (5) The hills.

(1) The dry Western tract, includes the whole of the country to the west of the Ganges between Cawnpore and Saharanpur. The normal rainfall of this tract varies from 23 to 32 inches.

(2) The Submontane tract, comprises an area, about 30 to 40 miles broad, bounded on the north-east by the foot hills of the Himalayas and the Nepal Tarai, and stretching from Saharanpur to Gorakhpur. Normal rainfall varies from 35 to 50 inches.

(3) The Central humid tract, consisting of the remainder of the Province with the exception of the Bundelkhand. Normal rainfall varies from 35 to 45 inches.

(4) Bundelkhand. Normal rainfall varies from 31 to 37 inches.

(5) Hills.

Cattle.

Recognised breeds, or types.	Distribution.	Type and general characteristics.
Hariana ...	Found in small numbers in districts of the dry Western tract, mixed with cattle of the Mehwati and smaller type. Bullocks of this breed are used by the wealthier cultivators throughout the dry Western tract and to some extent in the Central humid tract.	Dual purpose, heavy draft.
Mehwati ...	Found in western districts, chiefly those bordering the Rajputana States, in which districts are also found the cattle of the Hariana breed and smaller type. Bullocks of this breed are in general use with cultivators of the western districts, and are to be found in large numbers in the Central humid tract.	Dual purpose, medium draft.
Kherigarh ...	Distributed in eastern and north-eastern districts, and generally throughout the Submontane tract, the chief breeding-grounds being in Kheri and other neighbouring districts. Bullocks of this type are in general use with cultivators of the eastern and north-eastern districts and also in the Central humid tract.	Light draft.
Ponwar ...	Found in north-eastern districts of the Submontane tract and Central humid tract. Chief breeding-grounds are in the district of Pilibhit and neighbouring districts.	Light draft.
Kenwaria ...	Found in southern Bundelkhand	Light draft.
Hill cattle ...	Hill districts. Hill cattle are very small. A mixed and ill-defined type. Almora, Garhwal and Naini Tal.	
<i>Buffaloes.</i>		
(1) Murrah ...	Distributed in dry Western tract together with buffaloes of the <i>deshi</i> type.	
(2) Deahi ...	Distributed in the remainder of the Province.	

To enable improvement to be effected in the various types and breeds it is necessary at the outset to establish pedigree herds of each type. From the male progeny of these herds suitable stud bulls will be selected and distributed to approved breeders for grading up their own cattle. The only agency by which large pedigree herds can be established at present is Government. As the bulk of the cattle-breeders of these Provinces own only a few head of cattle and as far as their cattle and as well as their land are concerned are smallholders, measures which aim at cattle improvement must be adapted to dealing with the question generally from smallholders' point of view.

At present there are two Government breeding farms on which are established herds of the following breeds:—Hariana (Hissar), Kherigarh, Murrah buffaloes, and Sahiwals.

Farm.	Area.	Breeds of the established herds and number.
Madurikund, Muttra district.	613 acres	Hissar (Haryana) 376.
Manjhra, Lakhimpur, district, Kheri.	This year an addition of 782 acres has been made to this area. 553 acres. An addition of 2,000 acres to this farm is under consideration.	Murrah buffaloes 125. Kherigarh 127. Murrah buffaloes 103 and Sahiwal 108.

In order to preserve and improve the other breeds pedigree herds should be established, and to do this the following breeding farms are necessary:—

(1) *Mehwati breed*.—A breeding farm for the Mehwati breed situated some where in or near the dry Western tract. The cows of this breed possess considerable milk capacity, and the bullocks are good draft animals of the medium heavy type and are very popular with the cultivators of the Western districts. The breed offers, therefore, very good material from which may be built up a dual purpose type, suitable for the conditions of the Province. The breed is widely distributed in the Indian States, of Bharatpur, Alwar, and other neighbouring States. It requires preservation in the Province of Agra, for which it seems particularly suited. No time should be lost in establishing the farm and a herd for this purpose. The bulls produced from this herd will prove valuable for grading up the local cattle of many districts of the Humid tract, and will without doubt be in great demand in the dry Western tract.

(2) *Ponwar breed*.—This attractive breed of black and white cattle supplies a draft bullock slightly heavier and slightly less active than the Kherigarh. Hitherto no arrangements have been made for establishing a pedigree herd of this breed. Proposals are now under consideration for the extension of the Manjhra cattle-breeding farm to enable a herd to be established on that farm. Furthermore, it is proposed to take over grazing areas (grazing *bachailas*) in several districts in submontane tracts for the purpose of establishing pedigree herds of the Ponwar breed and another herd of the Kherigarh breed. Both the Kherigarh and the Ponwar are exceedingly hardy animals, and the grazing which these *bachailas* will provide, supplemented by a little cultivated fodder crop, will enable large herds to be established at various centres, from which breeding bulls can be conveniently issued to breeders who are in urgent need of them.

(3) *Kenwaria*.—A proposal is under consideration for the establishment of a cattle-breeding farm in Bundelkhand for the purpose of studying the special cattle-breeding problems of this particular tract and for the establishment of a pedigree herd of the Kenwaria breed and of buffaloes acclimatised to Bundelkhand conditions. As a result of the gradually increasing value of the livestock in these Provinces, Bundelkhand cultivators and cattle-breeders are becoming more interested in cattle improvement, and there is no doubt that the Bundelkhand offers a very wide field for cattle improvement and that cattle owners will welcome any assistance to this end.

(4) *Sahiwal*.—The Sahiwal breed is not indigenous to these Provinces. Cattle of this breed have been imported for dairy purposes from the Punjab and are used by city dairymen for the production of milk. On account of

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their sluggish nature bullocks of the breed are not popular with the cultivators of the dry Western tract (where the breed is at present mostly distributed) who prefer animals of more active type. The breed, however, unlike some of the other breeds abovementioned, possess considerable power of acclimatisation and in consequence appears to be widely distributed throughout India and numbers have been exported with success to the Near East. The herd at the Manjhra farm, therefore, was established with the object of investigating the capacity of this breed to stand the trying conditions of the Eastern and Tarai districts, where no animals of milk capacity exist and in which districts milch animals of imported breeds, whether cows or buffaloes, quickly deteriorate. The results so far obtained are very hopeful and the Sahiwal herd has proved itself capable of thriving and withstanding these conditions much better than the imported Murrah buffaloes, and the possibilities of this breed as a milch animal for these conditions are worthy of further investigation.

Since crop production brings in a better return than cattle-breeding, the attention of enlightened zamindars and others, who have, in recent years, begun to take a practical interest in agriculture, is attracted more to crop production than to cattle-breeding. Some time is likely to elapse before zamindars will be induced to establish large cattle-breeding farms and maintain pedigree herds on their own account. As already pointed out, if any progress is to be made in cattle improvement in the near future, it will be necessary for Government to establish farms and build up pedigree herds to supply the bulls necessary for effecting improvement in the district. By this it is not meant that all the bulls necessary will be supplied by Government. The bulls produced on the Government cattle-breeding farms should be utilised in such a way as to ensure that the improved qualities which they inherit and carry from the pedigree herds will not be lost when they are distributed to the breeders of the district. In order to ensure this, a system of controlled breeding areas has already been started. Two such controlled areas were started in 1923, (1) Muttra district, (2) Etawah district, in which efforts have been made to concentrate the best bulls produced on the Government farms with the object of maintaining touch with their progeny from selected cows. The male progeny of these bulls and selected cows are being reserved for purchase by this department for re-issue as breeding bulls to other districts in which the standard of the cows is not so good. These two controlled breeding areas have been organised in connexion with the Hissar (Haryana) breed of cows and the Murrah breed of buffaloes. With regard to other breeds no controlled breeding areas have yet been started. The organisation of the controlled breeding areas marked a turning point in the progress of cattle-breeding operations in these Provinces. Up to that time practically all the bulls of the Government farms were issued to District Boards, who again distributed them to approved zamindars. The District Boards contributed a portion of the cost of the maintenance of each breeding bull and the remainder was provided by the zamindar with whom the bull was located. This system, started by the Civil Veterinary Department, enabled that department to distribute a number of bulls and, to a certain extent, popularise them. The system, however, on the other hand, had defects and the following are some of them:—

(1) The financial position of the Boards allowed the Boards to maintain only a few bulls.

(2) Zamindars with whom the bulls were located, often showed little interest in the bulls, occasionally were reported to have appropriated the money contributed by the Board, and to have left the bulls to maintain themselves as best as they could.

(3) Bulls were often lost and the conditions of those inspected was seldom reported on well by Cattle Inspectors, and the wide distribution of bulls throughout the Province made their inspections very expensive, and any control practically an impossibility.

The organisation of the controlled breeding areas have proved (1) that good bulls are urgently required; (2) that village cattle owners are willing to subscribe and contribute towards their initial cost; (3) that village cattle owners and cultivators are willing to maintain them without any outside assistance; and (4) that, contrary to general opinion, village cattle owners are not apathetic to cattle improvement, but show a genuine desire to make the best possible use, as far as their knowledge and their economical condition allows, of the means put at their disposal for improving their cattle.

The organisation of one or more controlled breeding areas in suitable districts in connexion with each breed, stud bulls of which are being issued, is the next step indicated by experience so far gained. Such organisation ensures that the bulls bred on the Government breeding farms are utilised to their full extent. Some such organisation is necessary to supply the large number of bulls which are required in every district.

The cost of a controlled breeding area need not become a large sum. Cattle owners in the controlled breeding areas are now contributing towards the initial cost of the bulls, which they are taking now at 18 months or two years of age and which they are rearing in their villages. An experiment is being tried in the Muttra controlled breeding area of the possible use of *taccavi*, and a sum of Rs.40,000 has been put at the disposal of this section for this purpose. It is proposed to issue to the Muttra district young bulls to the value of this amount against the security of the villagers, who will repay the amount to Government plus $7\frac{1}{4}$ per cent. interest. Judging from the manner in which the cattle owners have contributed towards the initial cost of the bulls under the previous scheme, it appears likely that the *taccavi* system will be highly acceptable to them. If this is the case, the combined use of controlled breeding areas to raise the bulls and *taccavi* loan as a means of purchasing and distributing them should, in the long run, be productive of very appreciable improvement and at very small cost to Government, beyond the pay of the staff engaged in working the scheme.

District Boards and non-official agencies.—Although the maintenance scheme, already referred to, whereby bulls were issued to the District Boards, has, except in a few districts, fallen into abeyance, efforts have been made to encourage District Boards to take an active part in cattle-breeding scheme and in the supply of bulls to breeders of their particular districts. Small grants have been made by the Board of Agriculture to Agricultural Sub-committees of the District Boards for the purchase of bulls, and several District Boards have decided to contribute from their own funds for this purpose. The Cawnpore District Board recently subscribed Rs.10,000 from its own funds and has supplied on easy terms 100 cows of Haryana breed to zamindars of the district. The Board has indented on this department for stud bulls, and the cows recently purchased are being located in the vicinity of the stud bulls supplied by this department. The Moradabad District Board has under consideration a scheme for allotting an equally large sum from its own funds for a similar purpose. It will be seen that these Boards are becoming alive to the importance of cattle improvement, and are beginning to realise the active part which it is possible for them to take. "Example is a lesson that all men can read." The organisation by this department of controlled breeding areas in different parts of the Province will do much to stimulate non-official interest in cattle improvement, and these areas under proper

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control will, in a short time, be in a position to supply in a large measure the breeding bulls which will be indented for by District Boards who take up cattle-improvement schemes.

(ii) The two chief products of the dairying industry are—(1) Milk, and (2) *Ghi*.

(1) *Milk*.—There is a general impression that the supply of milk in the United Provinces is deficient. Actually the potential milk capacity of these Provinces is greater than the purchasing capacity of consumers. The cost of the production of milk, even in remote villages, puts it beyond the purchasing capacity of the average cultivator and agricultural labourer and the market for milk as such is, therefore, restricted to that of the more wealthy city consumer. As most village milk producers outside a radius of eight miles of towns and cities are unable to make use of the city or town markets, they adopt the less profitable practice of converting the milk into *ghi*, which is sold as such, and of utilising the by-products of this conversion for home consumption. The main milk consuming portion of the population, therefore, is dependent on a very small area for its supply of milk, and in consequence suffers from a deficient and expensive supply, the production of which is, in the main, in the hands of certain communities, namely, *ghosis* and *gowalas*. These practically monopolise the sale of milk both to consumers and to middlemen, the chief of which are *halwais*. Herds of considerable size are maintained both in the towns and cities themselves, and in their immediate vicinity. As practically all the fodder which these herds consume is purchased, the cost of their maintenance and of the milk production is very high. Adulteration is generally practised by *ghosis* and *gowalas* and the general conditions and methods of handling the milk are altogether insanitary, and the general outcome of these conditions is a supply of milk which is expensive, usually adulterated and seldom clean. In view of the monopoly which the above communities hold in regard to milk supply, it is not surprising that efforts to improve their position and methods have not been greatly welcomed by them.

Suggested Remedies.—(1) *Collecting agencies*.—The organisation of collecting, transporting and distributing agencies by men of position and standing, which will arrange for the collection of milk from village producers living at distant villages, its transport, under hygienic conditions to the city market, and its proper distribution under sanitary conditions to the consuming public.

(2) *Legislation*.—A Foods Adulteration Act, by which the sale of milk and dairy products will be controlled. Such control will enable agencies as those mentioned above to develop their business on sound and honest lines in face of the monopoly at present held by *ghosis* and *gowalas*, and will give the consuming public more confidence than they at present have in milk and dairy products, and will thereby increase and encourage the consumption of these valuable articles of food.

(3) *Transport Facilities*.—A better supply of roads, both *katcha* and *pucca* kept in such a condition as to facilitate the quick passage of light vehicles between villages and towns to enable the village milk to be freely drawn upon for town consumption. The provision of refrigerating cars or suitable milk vans on railways to enable the railways to be utilised as a means of transport of milk and dairy products.

By such provision milk production will be greatly encouraged in the main breeding tracts as, for instance, in the breeding and cattle-raising tracts of the Terai and submontane tract on the east and north-eastern districts. If the above facilities are provided it is possible that a state of over-production will sooner or later be reached to provide for which the possibilities of markets outside India should be investigated, for instance, Burma and

the Near East as markets for butter. The utilisation of these markets will necessitate the provision of cold storage accommodation at the main ports and also on the vessels carrying dairy products to these countries.

Although the milk capacity of the so-called milking breeds of both cows and buffaloes is, even amongst the best, not high and decidedly low, amongst those breeds of the north-eastern and eastern districts of the Province there is no doubt that if it were possible for a village cattle owner to obtain somewhere near the price for milk which the town consumer is willing to pay, he would make it his business to improve his stock by careful breeding and management or, failing that, to obtain cattle, either cows or buffaloes, from other districts which are capable of producing milk. So long as milk production is a source only of very small profits, the average cultivator finds his land a better investment for his surplus capital.

Ghi.—The bulk of the milk produced in these Provinces is converted into *ghi*, which is used for cooking purposes. In the absence of any legislative control, adulteration is widely practised. For this purpose vegetable oils and animal fats are frequently used. It is usually the middlemen or retailers who are responsible for the adulteration. Here, again, the result is the same as in the case of milk. The producer does not obtain a satisfactory price for his produce, and although there is a very distinct demand for pure and unadulterated *ghi*, consumers are seldom able to purchase *ghi* of this quality. There are several substitutes coming on to the market which are probably very valuable for the purposes for which they are used. To maintain and encourage pure *ghi* production, however, it is necessary that measures be enforced to prevent adulteration and to arrange for discrimination between *ghi* the pure product of milk, and *ghi* which is artificially prepared from animal fat and vegetable oil. In the absence of such arrangements, there is no means of bringing the producer of pure *ghi* and the consumer who demands pure *ghi* in touch with each other.

(iii) A formidable obstacle which lies in the way of cattle improvement in villages to which good bulls have been supplied is in the form of the scrub bull. Cattle breeders of the western dry tract and usually in the central humid tract castrate, for working animals, the best of their male progeny at an early age, and in the main castration is the general practice. It is difficult, therefore, to understand the origin of these inferior scrub bulls, which, though few in number, are responsible for considerable damage to the breeds. Some of them doubtless have been dedicated, but often their existence when other stud bulls are available is simply due to carelessness. In the controlled breeding areas efforts are being made to remove them, and applications are constantly being received from villagers for assistance in this work. Castration campaigns, which show a large number of castrations, are somewhat misleading. They generally mean that male animals have been castrated by official agency, which would otherwise have been castrated by the owners themselves had the campaign not been instituted. What is required is some means of removing the small scrub bull which is often left even after a castration campaign. If the staff of this section included a number of men qualified in this operation, considerable progress in this matter could be effected. In the eastern districts and in the submontane tract, draft animals are often left entire, and in these districts a cow herd containing a large number of bulls of varying sizes and ages is a common sight. These districts offer a fair field for castration campaigns, but since it is a fairly general custom to use draft cattle uncastrated, it is very difficult to suggest any method which may induce breeders to take the trouble of castrating their male stock when they can dispose of them with equal ease uncastrated. Instruction and education of the breeders combined with castration campaigns will effect much, but the progress must, of necessity, be slow.

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(b) (i) With regard to grazing areas, the common practice is for zamindars owning the land to lease their grazing rights yearly to a second person who charges a fee per head from the owners of those cattle which graze on it. It is, therefore, to the interests of the lessee to induce owners to graze as large a number of cattle as possible on the particular bit of grazing, the rights of which he holds on lease. Overstocking of the pastures is, therefore, a natural outcome of this process. Indian cattle seem to possess considerable power of withstanding periods of scarcity and of recuperating quickly when fodder becomes more plentiful. There is no doubt that cattle owners make great use of this quality, and in most parts of the Province make no arrangements for reducing their stock in accordance with the availability of fodder. At present, owing to religious susceptibilities, many cattle owners find difficulty in disposing of their aged stock, which are maintained long after they have passed the age of usefulness. Means that will facilitate the disposal of uneconomic stock, and which will relieve the pasture land of the burden of their maintenance, will enable the more economic stock to obtain a larger share of the available grazing, and by so doing will have very beneficial results. The number of skeletons and bones that are found lying on grazing areas indicate the number of animals that die from various causes. Many of these must have died from old age. If inducement could be given to butchers to pay a little better price for the uneconomic stock to enable them to purchase such stock before they become parasitic on the grazing areas, the expenses at present involved in collecting and transporting bones for the manufacture of phosphatic manures would be largely saved, since the animals would be driven to the slaughter-houses where the bones would be collected. This tendency of keeping alive old animals results in the depreciation of the hides, which spread over the whole Province, amounts to a considerable loss. The value of fresh bonemeal as a feeding stuff for young stock is only just being realised. The introduction of crushing machines and other necessary appliances into slaughter-houses for the rapid conversion of fresh bones would add another source of profit to those engaged in the meat trade, and another valuable source of concentrated food for cattle owners.

(ii) The borders of tilled cultivated fields are so narrow that the grass produced on them is practically negligible. What is produced is often *cheeled* by grasscutters during the cold weather, and is used for stall feeding, and what is left is grazed when the crop has been harvested. An increase or decrease in this form of pastures will have very little appreciable effect on the cattle.

(iii) In the United Provinces, where heavy yielding fodders as millets and pulse can be grown during the hot weather, it is rather surprising that cattle owners do not make greater efforts to supplement the fodder produced during the monsoon by the cultivation of fodder crops and irrigation during the hot weather. It is true that, in a few districts, there is a practice amongst a small number of cultivators to grow a small area of *juar* mixed with one of the pulses to be fed chiefly to the working bullocks just before the commencement of the rains. There is, however, no general practice of growing these heavy yielding fodder crops for other cattle, but the general tendency is to trust to a satisfactory monsoon to produce the bulk of the fodder required during the year. The low value of breeding cattle and the small profits which the cultivator derives from his cattle breeding may have something to do with this. He probably prefers to take the risk, and over a number of years the loss through making no provision is probably no greater than the expenses which would have been incurred in the cultivation of fodder crops. The provision of good bulls to increase the value of his male stock, and the proper development of the dairy industry to increase the return from milking cattle, will eventually induce cultivators to make more serious provision for their cattle during the period of scarcity.

(iv) With regard to breeding and working stock the absence of green fodders in the dry season is probably not the cause of much serious injury. It is possible that with milking cattle the yield of milk may suffer at certain periods from this cause. The cattle of this country, however, seem to have a digestive capacity particularly suited to dealing with dry fodders, and the problem as it appears to me is one of supplying fodder in quantity regardless as to whether it is green or in a dry state provided normal precautions have been taken in regard to harvesting it. In any case, fodder crops can be very easily and cheaply stored in a succulent state in the form of silage made in *katcha* pits dug in the ground, a method which is at the disposal of any cattle owner who grows sufficient green fodder and who cares to use it.

(v) As far as I am aware, no scientific inquiry has hitherto been made into the possible deficiencies of mineral constituents in fodder and feeding stuffs in these provinces. The reason for the deterioration noticeable in the cattle of the Province as one travels from west to east of the Province may lie in a deficiency of mineral constituents in the fodder which they consume. The reasons why, for instance, the cattle of the Ganges *Khadar* are very much inferior to those of the Jumna *Khadar*, why the cattle of the eastern districts and of the Tarai tract are so much smaller than those of the western districts, and why many imported breeds fail to thrive and breed well in the eastern districts are matters requiring investigation. Deficiency of mineral constituents may be one of the factors affecting them.

(c) With regard to the Province as a whole, there are two periods in the year when fodder shortage is most marked—

(1) in the month of March, i.e., just preceding the harvest of *rabi* crop, when the stock of fodder from the preceding *kharif* crop has been consumed.

(2) In the month of June, when the stock of fodder of the *rabi* harvest is becoming depleted, and the monsoon grass has not yet begun to grow.

The length of these periods is dependent on the weather conditions of the preceding *kharif* season. Since practically no fodder is stored, conditions which adversely affect the growth of grass and fodder crops in this season will prolong the period of scarcity. The period of scarcity in June depends on the time of arrival of the coming monsoon and also the extent to which previous monsoon has been favourable. The change from dry fodder to succulent monsoon grasses has a somewhat disturbing effect on the digestive system of cattle, and some time elapses before they can accommodate themselves to this succulent fodder. It is often noticeable that cattle in good condition at the beginning of the rains will at first lose condition, which, however, they regain a month later, attaining their best condition at the end of the rains and maintaining it for a month or so after the rains are over, during which period they seem to derive considerable benefit from dry grass and seeds.

With regard to the March period, after the harvest of the *rabi* crops the fields under *rabi* crop are opened for the grazing for village cattle, and these provide rough grazing for a week or so. If cattle owners do not supplement this sparse grazing by *bhusa* from their *rabi* crop, the breeding cattle are likely to suffer from scarcity till the break of the monsoon.

(d) There is no doubt that the grasses of the dry western tract, though low in point of yield, are very nutritious in quality. It is possible that all fodders of the western tract have superior feeding value to the same fodders produced in the submontane tract. The conditions of the cattle after a season of plentiful grazing is ample proof of the feeding value of the grasses of this tract. Methods of improving the common grazing areas require

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investigation. There is no doubt that much improvement can be effected by (a) *bundhing* to prevent erosion, and (b) by controlled grazing to enable re-seeding to take place.

The whole question, however, requires thorough examination, and for this purpose grazing areas in several districts should be taken over and put under the management of a special investigating officer.

The large tracts of ravine country in the dry western tract following the courses of the Jumna and other rivers at present produce very little fodder. The work so far carried out by the Forest Department in the afforestation of these areas has shown that it is possible not only to afforest them, but also that such afforestation converts them into grass producing areas of no mean value. The tract in which the ravine country is situated is highly suitable for the breeding of the best types of cattle of the Province. At present this tract suffers from occasional fodder famines. When afforested a portion of the areas under forest could be held in reserve for a year in each locality against the possibility of the failure of the rains in the succeeding year. Such afforestation schemes should be started in every district where ravine country exists, and every means should be used to encourage non-official bodies to co-operate with Government in the provision of funds for this purpose.

The districts in which fodder famines are prevalent lie in the western dry tract, and in so far as the more valuable breeds are concerned, they are important breeding districts. When fodder famines occur, much injury is done to the cattle from which it takes some time for them to recover. The methods of relief hitherto adopted by Government consist of the supply of forest grass, chiefly from the eastern districts. This method is expensive and the quality of the grass supplied is very low, and it is questionable whether the amount of relief afforded is worth the expense incurred. The bulky nature of fodder makes it extremely expensive to transport, and it is therefore essential, if the cost of production is to remain low, that fodder should be produced in sufficient quantities as near as possible to the places where it is required for consumption. If the cost of production is high, cattle owners cannot afford to use it to keep alive breeding cattle, which in themselves are not of very great value. In order to encourage the production of fodder a proposal is under the consideration of Government to grant a subsidy to cultivators in districts which suffer from occasional fodder famines, who will grow under irrigation heavy-yielding fodder crops as millets and pulses during the hot weather.

(e) As already pointed out, the profits derived from the cattle-breeding and the dairying industry have hitherto not attracted the attention of land owners in most districts of the Province. There is no doubt, however, that there is room for improvement, and that possibilities of improvement in these two industries are very great. Wherever intensive propaganda work has been carried on by the touring staff of this section, a keen practical interest has been awakened amongst landlords, who have shown much practical sympathy with the work. The knowledge of the principles of cattle-breeding and dairying possessed by the majority of landowners is very small, and at the outset it is necessary for personal contact to be established between them and the department to stimulate any practical interest. The local Cattle Inspector is the agency through which contact can be established, and it is noticeable that a Cattle Inspector, after a short residence in a district, is freely consulted by landowners on cattle-breeding questions. When personal contact with the department is established, literature and other forms of propaganda have some real meaning. The touring staff of this section should, therefore, be extended to allow of at least one Cattle Inspector in each district to keep the department in touch with landowners and cattle-breeders and to form the centre of propaganda work.

Oral Evidence.

37,691. *The Chairman*: Mr. Parr, you are a Deputy-Director of Agriculture in the United Provinces and in charge of the cattle-breeding operations?—Yes.

37,692. We have your note of the evidence which you wish to give us. Would you like to make a statement in amplification of that note at this stage or may I ask you some questions?—You may ask me questions.

37,693. The Commission has also before it Chapter VIII, page 38, of the "Report on Agriculture in the United Provinces," which was provided for our information some months ago. Probably you are familiar with that chapter?—Yes.

37,694. Would you give the Commission an account of your own professional training and past appointments?—I received my agricultural training at the Edinburgh University; I took the B.Sc. degree in 1913, and in 1913-14 I studied in Germany. At the outbreak of the War I returned to England and I was on military service up to 1919; I came out to India on the 1st January, 1920.

37,695. Did you join the Agricultural Service at once?—Yes.

37,696. How long have you been in charge of the cattle-breeding operations in this Province?—They were transferred from the Veterinary Department to the Agricultural Department in 1921 and I have been in charge ever since.

37,697. Would you give the Commission an account of the organisation of your branch in the Province? Is it divided into circles?—No. Our staff is yet very small and it has not been possible to divide the Province into circles. Really it is divided on paper, but I have found that the district staff can be better employed in concentrated work in controlled breeding areas, namely, in two districts. The present staff of five Inspectors and one officer of the Provincial Service are concentrated in two districts. Outside those two districts we have a senior Inspector carrying on the work. I decided on this concentration because it made for economy in work. We get in closer touch with the breeder, and it gives us an opportunity of studying cattle-breeding problems and dealing with them one by one as they arise. If widely distributed, the staff are inclined to spend most of their time in travelling and they tend to give their attention to bigger zamindars, with the result that we do not get into touch with the actual breeders of the villages. So I came to the conclusion that concentration was necessary, and the result of that concentration in the two districts has justified my conclusion. That is about the district staff. The main breeding operations are carried out on two farms and they have a separate staff.

37,698. What is the total extent of the staff outside the breeding centres?—Six Cattle Inspectors and one Provincial Service officer.

37,699. You give us some interesting notes on the several recognised breeds or types of cattle found in this Province and you say on page 441 of your note: "To enable improvement to be effected in the various types and breeds it is necessary at the outset to establish pedigree herds of each type." I understand that for the present you are confining the efforts of your staff to the four breeds, viz., the Hariana (Hissar), Kherigarh, Murrah buffaloes and Sahiwal?—Yes.

37,700. Did you make that choice, or did your predecessors make that choice, as a result of experiments with all the breeds?—My predecessors had already started the work. The land was acquired in 1912-13 for the two farms, and when I took them over herds of these breeds were already established on the farms. This was as a result of a survey that had been

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carried out by Mr. Moreland. He made recommendations on the basis of that survey and the work started was based on those recommendations.

37,701. Do you yourself subscribe to the view that these breeds you are dealing with at present provide all the material which you require, or would you like to make experiments with other breeds in the Province?—I think the work now in hand is sound, but I think it should be extended to three other breeds.

37,702. Do you regard the production of a dual purpose animal as your ultimate goal?—That is possible in two of these breeds, the Haryana and the Mehwati; but I do not think it is possible with the Kherigarh breed.

37,703. Meanwhile, you are not dealing with the Ponwar breed, are you?—No.

37,704. Are you making any experiments in the direction of crossing indigenous cattle with European stock?—Work of that nature had been started and I am carrying it on. I think when I took over charge there were something like 30 head of cross-bred animals of one type, Ayrshire-Sahiwal.

37,705. Have you yourself seen the Military Dairy farm at Lucknow?—Yes.

37,706. What view have you formed of the value of the Holstein cross-breeds there?—I have not examined the results of that cross.

37,707. How about your experience with the Ayrshire cross? What do you say about that?—From the general results which we have obtained, the first cross is very satisfactory and very promising. I have never gone beyond the first cross because by the time I arrived at the first cross the Military Dairy farm authorities began to report that the second and third crosses were not satisfactory.

37,708. You have not yourself gone past the first cross?—No; my experience is limited to the 30 head of cattle of that cross.

37,709. On page 443 of your note you are talking about the possibility of extending cattle breeding on a commercial scale, and you say: "Since crop production brings in a better return than cattle breeding, the attention of enlightened zamindars and others, who have, in recent years, begun to take a practical interest in agriculture, is attracted more to crop production than to cattle breeding." Do you know whether, in fact, the zamindar can make cattle breeding paying at all?—I think he can, under certain conditions; but the conditions do not exist, for instance, extensive grazing. Grazing is limited by cultivation.

37,710. *Mr. Culvert*: Free grazing?—Yes, practically; the grazing fee charged is nominal in comparison with the cost of fodder crop-production.

37,711. *The Chairman*: Then you go on to give us an account of the system of using the bulls that you are producing on your breeding stations. What is the extent of these controlled breeding areas which you are talking of?—The Muttra area which was only started two years ago contained 50 bulls last year and these were located in 50 practically adjacent villages; now it has been extended to 80, so that the work now comes practically half one tahsil.

37,712. Do you regard the gradual expansion of the controlled area as the normal method of development?—The object is the supply of bulls. At the commencement of my work I bought Hissar bulls from the Hissar farm. During the last two years the Hissar bull in the Punjab has increased in popularity and I have started to provide means of producing a supply in response to the demand which is likely to spring up in the United Provinces.

37,713. Are you attempting to protect this improved blood against rinder-pest?—No.

37,714. You do not consider that a practical policy?—I do not think it is practical.

37,715. The Muttra area itself has only been in existence since 1923. Do you think you notice any improvement in the cattle during these three years?—When the bulls are sent out they are quite young. We are just beginning to get stock produced by them.

37,716. The whole system is in the experimental stage?—Yes. As far as the system of concentrating bulls is concerned, I think it has proved very satisfactory. We find that the actual village proprietor wants the bull. At first he was asked to pay two-thirds of the price, which worked out at Rs.60, and he contributed freely. Now I have changed the plan and we are issuing bulls on a *taccavi* scheme whereby he pays Rs.120 in two instalments.

37,717. You say that “contrary to general opinion village cattle owners are not apathetic to cattle improvement”?—That is a statement based on the result of the work in the particular breeding areas.

37,718. You find a growing interest in cattle improvement in those districts?—Yes.

37,719. Are you carrying out any propoganda as to the provision of fodder in the areas where those selected bulls are used?—Yes; we are now issuing big posters giving the breeders indications as to how to get the bulls and what to do when they get them, and giving general instructions as to how to proceed to get the best possible results. We propose to stick up posters in every village.

37,720. Are they out yet?—They are in preparation.

37,721. What are you recommending in the way of forage?—We can make no particular recommendations beyond what they have already got. We can recommend them to grow more and encourage them to preserve it. I do not think that we have any recommendations which would be of any benefit to them, or which are likely to be accepted or adopted by them. In the matter of particular fodder crops, lucerne, for instance; the area under lucerne, in the Meerut District, has increased for some reason or other, perhaps because of better irrigational facilities or a local demand for it from cantonments; that is exceptional. The general tendency is to stick to the main cereal crops.

37,722. How about fodder preservation? Are you advocating the use of the silo?—Yes; in Muttra we carried out demonstrations last year and two silo pits were made by zamindars which were found to be quite satisfactory.

37,723. At the zamindars' expense?—We dug the pits; the crops were theirs and they made and utilised the silage.

37,724. Are they likely to continue the practice from year to year?—I think it is a practice which can be adopted. The trouble with it is that it requires very careful practical demonstration. Leaflets and ordinary verbal propoganda is of no use. Mistakes have often been made on my farms, and I think that it is a process which should be demonstrated very carefully in order that no mistakes may occur which would tend to prejudice the process in the eyes of the people.

37,725. On page 444 you tell us that the Cawnpore District Board recently subscribed Rs.10,000 from its own funds to supply, on easy terms, 100 cows of the Hariana breed to the zamindars of the district. What is the value of the average cow of the Hariana breed?—They were bought at prices ranging from Rs.100 to Rs.120. The District Board did not make any

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money out of this transaction; on the other hand, it did not incur much loss.

37,726. What do you think persuaded the District Board to take this step?—I think this District Board is one of the richest Boards and they seem to have a fair representation of members having agricultural interest on the Board itself. They took about 20 Government bulls last year which were distributed in the district. When inspected they were reported to be always in good condition. It seems to me that this is a direction in which much improvement can be made. Members of my staff have frequently discussed the possibilities of cattle breeding with the District Board and this is the outcome of these discussions.

37,727. And these cows become the absolute property of the zamindar who takes them from the Board?—Yes; the Board has tried to locate them somewhere in the neighbourhood of the Government bulls, and they have all been earmarked and their particulars recorded in registers.

37,728. Do the District Board allow you to have any alien stock?—We shall have to make terms with the owners of the cows.

37,729. Have you any co-operative dairy industry in this Province?—One was tried at Allahabad and it proved a failure. It is not a line that I have taken up myself. I think that it is rather difficult to get people in this country who deal in a commodity like milk to co-operate. I think they can get better profits by trading alone.

37,730. On page 445 you say: "The organisation of collecting, transporting and distributing agencies by men of position and standing, which will arrange for the collection of milk from village producers," and so on, is desirable? I do not quite see there what you mean by the expression "men of position and standing"?—The dairy trade at present is in the hands of *gowalas*; they are men who own a few cows and they buy their fodder chiefly; they are not cultivators and do not own land; they simply own a few cows and from these they supply milk. They are elusive in a way, and it will be very difficult to bring them under legislation. I think myself that if we could get, say, the better type of cultivator, the small zamindar or people of education to take up the business, the possibilities are very great.

37,731. Do you not consider that any organisation of that sort, involving, as it must involve, competition on a commercial scale with the existing *gowalas* is liable to meet with very considerable opposition and open hostility?—Yes, that is so; it has therefore been necessary to give at the start some sort of a subsidy.

37,732. Do you get cases of poisoning here?—No. I know of no cases.

37,733. Have you any municipal rules or acts protecting the public in the matter of the standard and purity of milk in your towns?—I heard the other day that there was a clause in the Municipal Act of the Muttra Municipal Board, but I think that it has been very ineffective.

37,734. At Cawnpore?—I do not know.

37,735. And at Lucknow?—I do not know of any such provisions being contained in the Acts of other Boards.

37,736. Do you not think that until the public is so protected there is very little chance of a man who wishes to sell pure milk of good quality being able to do so at a profit?—Yes, I do. I think that such protection is absolutely necessary.

37,737. I shall not ask you to suggest how you propose to meet the problem presented by you at page 447, which is to limit the number of uneconomic animals consuming the grazing, because I do not believe that you have any suggestions to make, nor have I heard any since I came out to this

country?—I have a suggestion to make which, I think, however, is rather a broad one, with regard to economic stock. What has always struck me as being remarkable is the great number of bullocks used purely for road transport. Considering the country is one in which there is a great shortage of fodder, I have always thought that if motor transport were given greater facilities for development a greater consumption of petrol would cause a decreased consumption of fodder, since the number of animals which are consuming valuable fodder would be reduced.

37,738. Do you not think that the more you leave the limited fodder available to be eaten by uneconomic stock, the larger the number of uneconomic stock will be?—That is so.

37,739. Is castration the only possible solution to the problem in India?—I think that the number of uneconomic stock will be reduced when the breeder finds that his economic stock are productive of better results. For instance, if the village breeder could get a better return for his milk, the tendency would be for him to keep better milk animals, but if there is no return he will keep as large a number of cows as possible, because any outbreak of disease might reduce his number.

37,740. Do you think that it would be a great advantage if the money value of Indian cattle were to be raised?—Yes, I do, if that would bring about a diminution in numbers.

37,741. And it would also have the effect of making it worth a man's while to look after his cattle and to take more pains in choosing stock for breeding?—Yes.

37,742. On page 448 you talk about the relative nutritive value of various fodders. Have you studied at all the work being carried out on animal nutrition at Bangalore by Mr. Warth?—I have seen the leaflets that have been published.

37,743. Would you regard that as a very important line of research?—Yes.

37,744. Have you experimented at all in the direction of trying to find leaves of trees upon which cattle can feed in times of shortage and which are normally out of their reach?—We have done no experiments in that direction.

37,745. Do you think that anything can be done in that direction?—Certain satisfactory results have been obtained in the Punjab in the Hissar farm.

37,746. Have you much prickly pear in this Province?—Very little.

37,747. Do you regard your present efforts as adequate in face of the cattle population in the Province and the obvious need for improving the breed?—No; I think they are totally inadequate. We could do a lot if the staff were increased. The staff at present is lacking in under-structure. We want staff in every district. If we had the staff to carry out sufficient propaganda work, I think the breeders themselves would come forward and finance a considerable part of the operation themselves.

37,748. You have already had practical indications of that?—Yes; I think that the staff would be paid for many times over.

37,749. Have you ever attempted to formulate a scheme which in your view would be sufficient and adequate?—No, I have never formulated a complete scheme. I think that there should be at least one touring officer in each tahsil. Such a provincial staff would be in a position to cope with the whole problem. The moment work in a certain area commences, the officer cannot leave the area. The work develops rapidly and soon requires undivided and continuous attention.

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37,750. Have you ever calculated as to how long it would take, with your present staff and expenditure, to effect a substantial improvement in the average animal in the Province?—I think that we shall see an improvement, say, in ten to fifteen years if the work is continued on the lines already begun; it might possibly be less; perhaps in 10 years we shall see considerable improvement in the controlled breeding areas. It is all a question of the supply of good bulls, and it is really very striking to see, in a short space of time, the amount of improvement which the use of a good bull can effect.

37,751. And do you find that as a rule the cultivators are prepared to make use of the good bull provided?—Yes.

37,752. *Sir James MacKenna*: What particular problems were you studying at Leipzig?—I was working in the Bacteriological Department.

37,753. I understand that in this Province you have a Cattle Committee to assist you?—Yes.

37,754. How is that composed?—The Director is the Chairman, the Legislative Council nominate two representatives, there is a representative of the Agra Zamindars' Association, and there are two representatives nominated by Government. The Veterinary Adviser is also a member. I think it is all given in Mr. Clarke's note.

37,755. Does that body function well? Does it take a lively interest in the subject?—Yes.

37,756. They are of real assistance to you?—Yes. They attend the meetings, discuss the proposals put up and have made some useful suggestions.

37,757. They have been of real assistance?—Yes. In time I think the Committee will become a very useful body, and will represent agricultural and breeding interests.

37,758. Did you attend the last meeting of the Board of Agriculture, when cattle was the principal subject discussed?—Yes.

37,759. Was that meeting of advantage to you in your work?—Yes. I think such meetings are useful. They give one a chance of hearing the points of view of other Provinces, and of meeting other officers engaged in the same work.

37,760. You would be in favour of regular sectional meetings of officers working on cattle improvement?—Yes.

37,761. Have you derived any help in your work here from the Imperial Dairy Expert, Mr. Smith?—I occasionally refer questions to him for advice, and he gives me the information and advice I require.

37,762. Has he visited you here?—No.

37,763. I understand that at the meeting of the Board of Agriculture to which I have referred the idea of a Central Cattle Bureau was discussed. What are your views as to the possible value of such a central organisation?—I think some organisation of that kind should be started. We must not expect immediate results from it, but eventually it will be very useful.

37,764. What staff will be required for such a body?—I think the office and staff of the Imperial Dairy Expert will be able to cope with the work.

37,765. What about technical staff? At present the technical staff may be said to consist of himself and Mr. Warth's section at Bangalore; do you think there is any need for a big central technical staff?—They would want something more to do if there were such a staff. They might with advantage be utilised for instructional purposes at some centre for training in animal husbandry and dairying.

37,766. You think that is the direction in which they would prove most useful?—Yes.

37,767. The actual work in the Provinces could continue to be organised as at present?—Yes.

37,768. Subject to advice from the central authority?—Yes.

37,769. To what extent do you think cattle breeding and dairy work can be co-ordinated throughout India?—To the extent to which this Cattle Bureau will be able to co-ordinate it.

37,770. It would act as a co-ordinating body?—Yes. At present things may happen in other Provinces which we do not hear of; a co-ordinating body would be useful.

37,771. Do you think any stimulus would be given to cattle-breeding by the organisation of All-India shows, on the lines of those which have been so effective at Home?—The trouble is that the cattle owners are mostly poor men who cannot afford to take their cattle to big shows.

37,772. There is no cattle-breeding class here such as we have at Home?—No.

37,773. Do you think that prizes and so on would not bring such a class into existence? Are they all small men?—I think at present the man who takes a real interest in cattle and who will go to a show and watch the judging with interest is the small man.

37,774. Have you had any men from this Province trained at the Imperial Institute in dairying?—Yes, we have two men who have been through a six months' course, and one is now undergoing training in the same course.

37,775. A proposal has been made to publish a journal devoted almost entirely to cattle-breeding and dairy problems. Do you think that will be a good thing?—Yes.

37,776. The Agricultural Journal does not give you sufficient information on those questions. You think you should have a separate journal?—I think a special journal will encourage contributions and stimulate people to write on problems which are of interest to those engaged in cattle-breeding but are not of special interest to other members of the Agricultural Department.

37,777. *Professor Gangulee*: Will that journal be published by the Central Cattle Bureau?—It could be.

37,778. Would you recommend that?—Yes.

37,779. How often does your Provincial Cattle Committee meet?—Usually twice a year. It met in February last year, but has not met since.

37,780. Are the proceedings published?—A communiqué is sent to the press.

37,781. We understand that your work is now chiefly confined to the control of breeding areas?—Yes, the staff is chiefly concentrated in those areas.

37,782. The idea is to facilitate supervision and get results more easily?—Yes.

37,783. Can you give us further details of your organisation for the distribution of bulls? What are the channels through which you distribute these bulls?—In the controlled breeding areas the Cattle Inspectors get in touch with the breeders.

37,784. The Cattle Inspectors are under you?—Yes, they are part of my subordinate staff.

37,785. *Mr. Calvert*: Are they veterinary men?—One is; the others are members of the Subordinate Agricultural Service.

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37,786. *Professor Gangulee*: These Cattle Inspectors go from village to village?—Yes, and get indents from breeders or villages. Now that the villages have to pay, they are submitting indents under a *taccavi* loan scheme.

37,787. These bulls are not given on loan from the Government?—They have been, but now these people are paying for them and they will become their own property.

37,788. Do they get them now individually or collectively?—We get a zamindar who will give security for the *taccavi* loan. He may recoup himself from the village or not; that is his affair.

37,789. Do District Boards ask for bulls from your Department?—Yes.

37,790. In large lots?—We try to send them a lot at a time.

37,791. Is more than one District Board interested in it?—Yes. This week I have sent 15 bulls to the District Board at Cawnpore; Farukhabad, which has eight already, is taking 15 more, and I am sending a dozen to Shahjahanpur. Altogether I am sending out 42 this week.

37,792. So you are able to supply bulls to District Boards outside the controlled areas?—Yes.

37,793. Do they pay for them?—They only pay way expenses. The idea is that before we ask people to pay we must demonstrate the value of the bulls, so we send them out through the District Board or through our staff on loan.

37,794. How do you supervise this work? These bulls are now being distributed all over the Province, and it is necessary to have proper supervision?—If we had more staff we could undertake the supervision, but, as it is, a lot of the work is unsupervised. We attend to complaints, but when there are none we take it that all is well.

37,795. Do the villagers co-operate in the work of eradicating scrub bulls?—Yes.

37,796. Have you employed co-operative agencies for the introduction of better bulls or better kinds of fodder?—I have addressed the Registrar of Co-operative Societies regarding a bull purchase scheme. The Co-operative Department is very sympathetic, but I think it has already as much work as it can manage.

37,797. I understand you are not conducting any experiments to determine the food value of various grasses and fodder crops?—No, we have no facilities.

37,798. But you carry out silage experiments?—Actual feeding experiments? No.

37,799. You try to preserve fodder by silage?—Yes. Silage is our chief feed.

37,800. Do you use tower or pit silos?—Both.

37,801. Which is the most convenient?—I think pits.

37,802. Pits in this part of the country will have to be shallow, because the water-level is high?—Yes; about 4 feet.

37,803. Who teaches animal husbandry at Cawnpore College?—The Professor of Agriculture and his staff.

37,804. You do not take part in teaching?—No.

37,805. Are you in touch with the Allahabad Agricultural Institute?—Yes.

37,806. To what extent is the silage method known to the cultivators? Do they know anything about the preservation of fodder?—Very little I

think. We carried out a small demonstration in the Muttra district last year and we carried out further demonstration this year; I have a proposal with regard to that in this year's schedules. I think it is a process which requires very careful demonstration.

37,807. Is the practice of castrating bulls popular among the cultivators? I think you adopt the Italian method?—Yes, it is being adopted, I think, but still the country method is the method generally adopted.

37,808. You discontinued the crossing of Ayrshire and Montgomery?—Yes.

37,809. Why?—The Ayrshire bull died and a lot of his progeny died of rinderpest.

37,810. Of the various breeds of cattle in this Province, do you find the Hissar breed more promising from the point of view of milk yield than any other breed?—From the point of view of milk capacity the Sahiwal is the real milking cow, but the Sahiwal is not indigenous in this Province; it is a Punjab breed. Of the indigenous breeds the Mehwati is the most promising, but that is only indigenous to a few districts. We are taking up the Haryana or Hissar because they are such excellent draught cattle. The cultivator's first requirement is a draught animal, and if we can add a little milk capacity to that draught capacity, we shall have a good animal.

37,811. Have you a system of milk recording on your farms?—Yes, on the farms the milk is recorded.

37,812. Do you grade your animals?—Yes, we grade them and feed them in accordance with the amount of milk they produce.

37,813. With a view to balancing the ratio of food and milk?—Yes.

37,814. Do you consider that the standardised method of keeping records of breeds and their performance would be useful throughout the country?—I think there are very many more pressing problems.

37,815. But you are going to establish a herd register some day, I hope?—But the money that would be spent in establishing records and employing staff to carry out the work necessary to establish records of that type, could be very much better employed in dealing with some of the more immediate problems.

37,816. But if you are going to build up a herd, you must have a herd register to begin with?—Yes.

37,817. For that you require a certain standardised system of registration?—Yes.

37,818. Do you think uniform methods of grading and recording would be useful?—Very useful if the staff were available. It would take some checking and the staff would have to be of a fair standard of honesty and trustworthiness.

37,819. Do you find any indication of co-operative production of dairy produce being undertaken in the villages?—I do not think so.

37,820. Of course, success in cattle breeding depends largely on the improvement of the village dairy industry?—Yes.

37,821. If you do not make your village dairy industry pay, you cannot make the cultivator interested in breeding work?—No.

37,822. So, you do not think there is, as yet, any indication in the direction of co-operative production being taken up by the villagers themselves?—No, I do not think so; I think along those same lines there is an opportunity for development, but operations must be organised by one individual.

37,823. We are informed by a writer from this Province that milk is four seers per rupee in Allahabad while it is 12 seers per rupee only 15 miles away from Allahabad?—Possibly.

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37,824. Do you think anything could be done to develop village dairy industry through co-operative organisation?—Yes, that is one of my strongest recommendations.

37,825. *Mr. Calvert*: On page 443 of your note, in connection with your controlled areas you have mentioned that the male progeny are being reserved for purchase by the department for re-issue. Is that not rather mixing up your pedigree?—Yes, but it is not indiscriminate; we are selecting particular cows.

37,826. That is a temporary measure?—The progeny will not be re-issued to the districts where the controlled breeding is in operation; they will be sent to other districts. The average bull so bred will be very much better than the bull that is now being used in most villages. A selected bull from one of our Hissar stud bulls out of a good average cow is a very much better stud bull than at present exists in many districts; these bulls will not be put back into the controlled breeding areas.

37,827. How do you get over the difficulty of feeding these bulls in your controlled areas?—There is no difficulty at all; the villagers themselves, the breeders, are very willing to let them graze their own crops.

37,828. They do not get too wild?—No; I insist on the bulls being brought into the village every night, and they are fed a little grain or something.

37,829. In discussing milk problems, you have made a series of statements; have you carried out any investigation into the economics of rural milk production?—We have a scheme working at Agra and I believe the proprietor of the scheme is going to give evidence before the Royal Commission.

37,830. But has a real investigation been made of the economic side?—Beyond what has been forthcoming from this scheme nothing has been done.

37,831. When you say that the cost of the production of milk puts it beyond the purchasing capacity of the average cultivator, is that a guess or is that the result of a careful investigation?—There is no desire on the part of the cultivator to produce it. If he can sell it, he will produce it, but if he cannot sell it he does not produce it.

37,832. But he produces more?—He will produce more if he can sell it.

37,833. Is that opinion you have expressed this moment based on a careful investigation, or is it a mere guess?—I think it is an opinion that has grown on me. I would not like to say it is a guess. I still hold to that opinion. I cannot quite account for it.

37,834. It is not based on a special investigation?—No.

37,835. Similarly, on page 446, you give another opinion; you say there is no doubt that if it were possible for an average cattle owner to obtain somewhere near the price for milk that a milk consumer is willing to pay, he would make it his business to increase his stock. Is that a guess or is it the result of a careful investigation?—It is very noticeable that, where we have had these milk schemes started, the first thing the milk producers have asked for is an advance for the purchase of good cows. They ask the organiser of the scheme to give them such advances, and in fact if he gives them advances it ensures the success of the scheme; I argue from that that if by such means they get good cows and then take one of our bulls, improvement will follow.

37,836. That is not based on observation of an actual case?—Yes, that is what happened in this very village; advances were made to them to buy she-buffaloes and they have taken a buffalo bull from a Government farm.

37,837. You say he would make it his business to improve his stock by careful breeding; that is a very different thing?—They have taken so much care that they started off with good females and they have taken care to obtain a good male.

37,838. To the agnostic mind you are not prepared to produce your evidence; you have not any evidence to produce in support of that?—No, not beyond that.

37,839. Do you think your town consumer is willing to pay for pure milk?—I think he is. I am not speaking generally of all town consumers, but I think there are town consumers who would be very willing to pay for pure milk.

37,840. Do you know a case in which an effort to supply pure milk has been organised and the town consumer has been willing to pay the price for that milk?—We are just organising a scheme at Muttra; farm milk is being supplied to Muttra and the price, of course, is cheap.

37,841. Do you think the town people are buying Keventer's milk?—I do not think they will pay the price that he charges for it.

37,842. Practically nobody will buy Keventer's milk?—No, but I think milk from the village can be supplied very much cheaper than Keventer can supply it.

37,843. Milk can be supplied but people will not buy it?—They will buy it provided the price is not too high; pure milk can be supplied at six seers a rupee.

37,844. You say there is a very distinct demand for pure and unadulterated *ghi*; is that based on any successful attempt to sell pure *ghi*?—No.

37,845. Do you know of anyone in any town in the United Provinces who is prepared to sell pure *ghi* as such?—No, he cannot compete.

37,846. They will not sell pure *ghi*?—No, but my point is that if the public were sure that they were buying a pure article, which they are not, they would be willing to pay the price.

37,847. You have actually found people, even among the educated class, willing to pay for pure *ghi*?—I have never dealt in *ghi* myself, but that is my opinion.

37,848. I ask because we did put pure *ghi* on the market and no one would buy it. Have you ever worked out how many days a year a pair of bullocks is employed on your average holding of about 7·7 acres?—No, I have never worked it out.

37,849. Would you be surprised if it came to less than 70 days a year?—No, I would not.

37,850. Using bullocks for road transport is a method of employing them during the 290 empty days?—Yes.

37,851. Your department was formerly under the Veterinary Department and was placed under the Director of Agriculture in 1921?—Yes.

37,852. Do you consider that to be an advantage?—I think it is.

37,853. You think cattle breeding should be under a chemist rather than under a veterinary officer?—I think an agricultural chemist with experience in all agricultural problems is better able to deal with cattle breeding problems from an agricultural point of view than is a veterinary officer.

37,854. On this question of supplying milk to towns by better breeds of cattle, do you think liability to disease is an important factor?—It is, when the cattle are valuable; but if the cattle are not valuable, and many of the United Provinces are not, the importance of it can be over-estimated.

37,855. You are taking up the improved breed with a view to get a better milk supply?—Yes.

37,856. Do you not think the control of disease will be a very important factor in that?—Undoubtedly, it will be.

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37,857. So that really you are not going to make much progress with superior breeds of cattle until you get greater immunity from disease?—Loss from disease on the Government farms is very small; it does not amount to more than 6 per cent. per annum.

37,858. *Mr. Kamat*: In this Province are there any instances where dairies were started by private agencies which failed?—I believe there are.

37,859. Did you investigate the causes of the failure in such cases?—No.

37,860. Can you guess what those causes might be?—I think unfair competition is the chief cause.

37,861. Competition with the *gowalas*?—Yes.

37,862. You suggest legislation as a remedy to prevent adulteration. We were told in another place that in towns or cities like Bombay legislation was attempted to prevent adulteration, but still prosecutions were not successful because the milkman or the middleman somehow or other managed to evade the law by changing the names or by other devices. Do you think that would be likely to occur here also?—I think it is quite possible; yes.

37,863. Then again if you legislate and have only pure milk on the market, as my colleague has suggested, what would be the result so far as the prices are concerned for the poorer classes of people?—The price might go up to start with, but legislation would so encourage production that the price would go down again; I think production would overtake it.

37,864. Supposing my *chaprassi* were a married man and he required half a pound of milk every day for his infant; would he be prepared to pay at the rate of six or eight annas a seer?—I see no reason why the price should go up to that extent. The price might go up a little to start with, but it would go down the moment people began to realise that here was an opportunity of carrying on the trade with honest competitors. I am sure the encouragement would be so great that in fact the price of milk a few years afterwards would be lower than it is to-day and it would be a pure supply too.

37,865. *Professor Gangulee*: You mean there would be more milk in the market?—Yes; there would be plenty of milk; the actual supply brought into the city would be greater.

37,866. *Mr. Kamat*: Here again we have the experience of two or three cities where milk committees were started to investigate the problem, committees of experts. They went into the details of the problem, how much the price would go up, what the supply would be and so on, and the opinion of these milk committees was, I think, that the poor man would go without milk. Would you agree with that?—I should like to see what the result would be under actual legislation and compare it with the deliberations of the committee.

37,867. As a matter of fact it is based on a close investigation of the problem rather than a mere guess?—I think the result of an actual trial of anything in this country may probably be very different from the opinion one forms as a result of long discussion and deliberation.

37,868. Taking another remedy suggested by you, namely to establish collecting agencies near big towns for collecting the milk from villages and transporting it under certain conditions, can you amplify that by taking a concrete case of a town like Cawnpore or Lucknow? What is the present rate of milk in Cawnpore?—Four seers per rupee.

37,869. What is the rate beyond ten miles of the city?—It will probably be eight seers per rupee.

37,870. And what would be the cost of transport and collection?—The case I have in mind is a case of a scheme actually in operation in Agra. I

think there the price is somewhere about four seers per rupee. The scheme is very successful there.

37,871. In that case, after getting this milk from the villages have you been able to sell it in the town at more than four seers? What was the rate in Agra before you began collecting the milk from the villages and what is the rate now? Has it become cheaper?—I do not think a sufficient amount of milk has been brought in to affect the prices. The difficulty is we have not been able to find other men to start this business.

37,872. *Professor Gangulee*: The method of transportation is a factor to be taken into consideration?—Yes.

37,873. *Mr. Kamat*: From that one concrete instance of Agra you are not in a position to say that you have been able to bring down the rate?—Now they are dealing only with ten to twelve maunds; but if we had ten such organised schemes there is no doubt that the price would come down.

37,874. You mean, by tapping all the villages within a radius of ten or twenty miles?—Yes. If two villages can supply ten to twelve maunds you can imagine how much milk there is that can be tapped from all the villages, and if all is brought in it will certainly affect the price.

37,875. Why has not this sort of business been taken up by private individuals if it is a paying one? If you can get milk at the rate of eight seers per rupee by going twenty miles off and can sell it here at four seers a rupee, how is it that a large number of middlemen have not sprung up?—That question may be asked. The selling of milk has to be taken up on a large scale. The producing centre requires certain conditions, for instance, the proprietor, if possible, should be a zamindar, for then he has a certain amount of control over the producers and he can say to his tenants, "I want so much milk." Again the handling of milk requires technical skill. Competition with *gowalas* has to be faced. If possible, the proprietor should be a man of standing in the place where the milk is consumed so that he can keep in touch with the consumers. The business requires much technical knowledge and skill.

37,876. *Professor Gangulee*: Would you not sell that milk after pasteurisation?—Yes; if there are such facilities it will help the business considerably. Morning milk can be sold in the evening and the evening milk in the morning. The villager has special times for milking.

37,877. *Mr. Kamat*: These are all minor difficulties. One need not count them as serious difficulties, especially if a man can double his money; he must be prepared to undergo such difficulties if he wants to make money?—There is a profit in it, but it is not a matter of doubling the money.

37,878. With regard to your idea to legislate in the matter of *ghi*, I suppose you presume that there should be two classes of *ghi* placed on the market, one, pure *ghi* for the better class of citizens who can afford to pay for it, and the other what you call discriminating *ghi*, that is, artificial *ghi*, for the middle class or the poor class; is that the idea?—Yes.

37,879. Obviously you wish to have two kinds of *ghi*, first class and second class?—*Ghi* as the product of milk and *ghi* as the product of the vegetable oils.

37,880. So that the purchaser who wants the cheap *ghi* goes and buys it with open eyes?—Yes.

37,881. *Sir Ganga Ram*: Are the male calves produced as a result of crossing by foreign bulls good for ploughing purposes?—That depends on the female side.

37,882. Do the qualities take after the mother?—Yes, to a certain extent. They do produce very good cattle. I have cross-bred bullocks from several breeds, including the Ayrshire cross with Hissar, and they are very good.

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- 37,883. Does the off-spring stand the climate?—Yes.
- 37,884. On page 448 when you speak of mineral deficiency, have you in mind salt or any other mineral?—Phosphates and lime chiefly.
- 37,885. Lime in what form?—Ground lime.
- 37,886. Put in the fodder?—Yes.
- 37,887. Has that been tried?—Yes; it is an adopted practice at Karnal.
- 37,888. Not merely salt?—No.
- 37,889. Do you recommend the addition of salt?—Yes.
- 37,890. How much?—One lb. per 100 lbs. of ration.
- 37,891. Would the giving of salt improve the milk supply?—I think it is essential for the well-being of the animal.
- 37,892. You say in one place that Government gives a subsidy for breeding cattle; how much is that?—The only subsidies given by the Government are given for the milk schemes and in the shape of assistance to District Boards.
- 37,893. Do you mean by subsidy that the money has got to be paid back to the Government?—It is given as a grant and has not to be paid back.
- 37,894. Have you ever come across cases in which sweepers have been thrusting poisoned needles in order to kill the cattle so that they may obtain the carcass of the animal? This used to be done in the Punjab?—I have not heard of any actual cases.
- 37,895. You know the system in the villages is for the sweeper to take away any dead animals that lie about the place, and in order to obtain more dead animals, the sweepers in the Punjab have been doing this mischief? It has been stopped now?—No, I have no experience of it.
- 37,896. *Sir Thomas Middleton*: In the Report on Agriculture in the United Provinces, which has been given us, particulars are given for four areas, Meerut, Jhansi, Gorakhpur and Lucknow. We have got a number of details about the size of holdings, etc., for these areas. I want you to tell me, if you can, in which of these districts you find the best cattle?—In the Meerut district.
- 37,897. Can you give me any indication of the cost of keeping a pair of bullocks in Meerut?—I think it is about a rupee a day.
- 37,898. It would not cost a cultivator Rs.365 to keep his pair of bullocks for the year?—I have not worked it out in detail and I think that to arrive at the actual figure will require a very careful investigation.
- 37,899. A statement is made in this Report that the allowance for grain for two bullocks and two cows is two maunds; that is the amount that is allowed in this estimate of the cost of keeping bullocks. If the cows get nothing at all it means that the two bullocks get no more than 2 lbs. of grain for 40 days. That must be incorrect, and I want you to go into this question of the cost of keeping a pair of bullocks and give us your considered view with regard to the Meerut district. I think you know the Meerut district best?—Yes, I will let you have it.
- 37,900. In the Meerut district one pair of bullocks cultivate about nine acres, and of that area about one acre or rather less than one acre on the average will be irrigated from wells. What area of land ought a good pair of bullocks to be able to cultivate in the district?—Probably 15 to 17 acres.
- 37,901. So that there must be, on the average holding in the Meerut district and in other districts where the figures are similar, a great waste of bullock power, assuming the bullocks to be good animals?—Yes.
- 37,902. When we have got your figures as to the cost of keeping the cattle we can estimate what that means to the cultivator?—Yes.

37,903. In connection with your breeding operations: I think you are at present breeding mainly for draught?—Yes, we look upon that as the primary consideration.

37,904. Which of these breeds that you have described in your memorandum have shown most uniformity and most signs of careful breeding in the past? Looked at from the point of view of breeding, which is the best?—I think the Mehwati is the best.

37,905. So that the Mehwati would make a good foundation stock?—Yes, it would.

37,906. What advantages do you claim for a diversity of breeds in the Province, assuming they are draft breeds?—We have rather diverse conditions. There is a tract of country with a rainfall of 22 inches, another whose average is 40 inches and yet another which is a big area, with a rainfall of 60 inches.

37,907. From your memorandum I gather that you want heavy bullocks in certain areas and light bullocks in other areas?—It is not a matter of weight; it is a matter of which class of animal will live and thrive under the prevailing conditions. Take the Mehwati, for instance, in the eastern districts he becomes sluggish and does not show the same activity he displays in his own tract, besides this he is expensive to maintain in the eastern districts.

37,908. In his own tract the Mehwati is as active as the Kherigarh?—He is a heavier animal but, comparatively speaking, just as active.

37,909. Do you think that when the Mehwati goes into the eastern districts he may not get enough food to keep up his bigger body, and that it is for this reason that he becomes sluggish?—No; my experience has been that during the first year of his use on an eastern district farm he was found to be very active and satisfactory; in the second year he showed signs of wear and tear, and afterwards became gradually less active.

37,910. So that you are satisfied that at least several breeds are wanted in the Province?—Yes.

37,911. With regard to the distribution of cows on cheap terms in the areas of District Boards, do you know if any members of the District Boards have secured cows under this scheme?—I believe they have done so.

37,912. So that this would add to the popularity of the scheme with District Boards, would it not?—Yes.

37,913. On page 445 you refer to the fact that the potential milk capacity of the Provinces is greater than the purchasing power. How much milk do the calves get in this Province? Is there any area in the Province in which a calf gets enough milk?—The male calf always gets enough milk; the female calf often goes short. That is the general rule.

37,914. I suppose the calf gets as much milk as its mother can give, but, as you point out, probably the best mothers do not give as much as 10 lbs. of milk a day?—That is enough to rear a calf.

37,915. But what does a fair average cow give per day?—It would probably not give 3 or 4 lbs. But it is a case of habit with the calf which, from its very birth having been used to a small quantity of milk, can maintain life on a small yield of milk from its mother.

37,916. On page 447 you say that Indian cattle seem to possess a considerable power of withstanding periods of scarcity. You appear to be unduly cautious about that, but is it not an undoubted fact that they do possess that power? What would happen to the stock which you have seen in Britain if they were exposed to the conditions to which Indian cattle are exposed? How long would any improved breed of animals stand the

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treatment that the animals of this country get?—Yes, that is one of the most valuable points in the Indian breeds.

37,917. They are undoubtedly very hardy, are they not?—Yes.

37,918. Sir Ganga Ram referred to the deficiency of minerals? Have you noticed, in any parts of the Province, cases of depraved appetite, cattle eating earth or excrement?—Yes, I have.

37,919. In which tract?—I have noticed it particularly in the western tract. It has not absorbed my serious attention, but I have seen cases.

37,920. Wherever that is noticed, special attention should be given to the mineral supply of cattle?—Yes.

37,921. You say that fodder is never stored. By that you mean that *kudbi* is never kept over from one season to another?—Only in small quantities. The practice is not followed to the same extent it is in the Punjab. The conditions under which it is kept in this Province are not good and during the monsoon much of it is spoilt, with the result that only sufficient is kept from each year's crop to supply each year's needs.

37,922. You suggest the giving of a subsidy to cultivators in certain districts to grow heavy yielding fodder crops under irrigation. What fodder crops have you in view?—The ordinary millets, *juar* and *bajra*.

37,923. What pulses?—*Lohia* and *juar*.

37,924. Do you not think that the owners of cattle are disposed to trade too greatly on the hardness of their live stock in this country?—I think they are. There would be fewer cattle if they were less hardy. In regard to cows it is undoubtedly a fact that the moment the cow goes dry she has to fend largely for herself.

37,925. Do you think it is reasonable to subsidise men to keep their own cattle alive?—You do not want the valuable stock to die; if they were given a subsidy and were encouraged to grow more fodder, they would keep alive their own valuable stock.

What would happen to you in Britain if you let your animals die for want of food? You would get no subsidy from Government!

37,926. *Rajah Sir Rampal Singh*: Have you tried to introduce the Janatpur breed in this Province?—No.

37,927. It is very popular, especially for draught purposes?—What is the distribution of the breed?

37,928. Janatpur, in Bihar. It is considered to be the best breed for draught purposes. Has no experiment been made with that breed?—Not in this Province.

37,929. For how long has this practice of giving bulls to District Boards been going on?—I think the first bulls were distributed in 1914 or 1915. Breeding operations started with the establishment of a farm in 1912.

37,930. I remember bulls being under District Boards in 1900?—That may have been organised by the Deputy Commissioner.

37,931. How long will it take to improve the cattle of these Provinces if only a *tehsil* is taken in hand as a controlled area?—I think, from our experience, using Hissar bulls as sires in the Etawah district, it will take about six years. A tremendous improvement has been brought about in many villages of that district in that period. To give you a concrete instance, I tried in that district to buy the male progeny of a very small cow, which had been covered by a Government Hissar bull. The value of the cow could not have been more than Rs.7, but I offered the owner Rs.75 for the calf by this bull and he refused the offer. That was rather an exorbitant price to offer, but I think the market value of the calf must have been at least Rs. 50.

37,932. How many bulls do you send out every year?—The number is rapidly increasing. This year we have sent out about 200.

37,933. It will take a long time before you succeed in improving the whole of the cattle in this Province by that method?—Yes.

37,934. 200 is nothing for a large Province like this?—That is so.

37,935. Do you not think steps should be taken to speed up the process?—Yes. I think the *taccavi* scheme we have started, and which is giving very promising results, should be widely extended. That would achieve the end we have in view in a very short time.

37,936. But you say you only sent out 200 bulls this year?—With this scheme more money will be available; the breeder will be financing the operations himself to a great extent, and it will soon be possible to send out 2,000 bulls a year.

37,937. *The Chairman*: Are you a trained chemist?—No.

37,938. What branch of agricultural training did you undertake in Germany?—I studied bacteriology.

37,939. Have you ever done any bio-chemistry?—Only sufficient to obtain the B.Sc. degree.

(The witness withdrew.)

RAI BAHADUR LALA ISHWAR SAHAI, Man Bhawan, Fatehpur.

Replies to Questionnaire.

QUESTION 1.—RESEARCH.—(a) and (b) Fundamental research work should be carried on at the Central Research Institute and applied research work should be carried on in the Provinces under the guidance of the Central Research Institute so that the work may not overlap.

QUESTION 2.—AGRICULTURAL EDUCATION.—(i) No. For example, in our Province there is only one agricultural college, at Cawnpore, and an agricultural school at Bulandshahr. They are quite insufficient for the whole Province. In my opinion, a larger number of students would like to have agricultural education if it were provided conveniently.

(iii) Wherever available for practical work.

(iv) The attendance is not satisfactory because neither the students nor their parents know the advantages and value of scientific agriculture, and there are no prospects for them after receiving an agricultural education. The main idea of the people who receive education is to secure some appointment by that means, and there are very few people who acquire agricultural or any other kind of education for its own sake. The general idea prevailing here seems to be that no special education or training is necessary for *zamindari* or agriculture, and for this reason the attendance is not satisfactory.

(v) Generally to secure an appointment, and in rare cases to acquire a knowledge of agriculture for its own sake.

(vi) Very few pupils are drawn from the agricultural classes because in rural areas they have no idea about agricultural education.

(vii) The period of training at college for the present is four years and two years in schools, but the period can be appreciably reduced by curtailing the number of holidays that are allowed in the Agricultural College. The number of holidays allowed in the Medical College is quite sufficient for the students of the Agricultural College.

(viii) All these things will make agriculture more attractive to the students and will be most useful.

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(ix) Almost all the students who have passed have taken a Government appointment, and those who have not yet succeeded are anxiously waiting for suitable opportunities to get in.

(x) By means of running successful demonstration farms and by making agriculture a compulsory subject in primary classes and optional in secondary schools.

(xii) By making primary education compulsory and by introducing part time and night schools by co-operative societies and other public bodies.

(xiii) Since the introduction of the Reforms and widening of the franchise, the uneducated zamindars and other people who have great influence in rural areas have got on to the District Boards and educated men who generally live in cities have very little chance of membership, e.g., in Fatehpur there are only two members who have received University education. Nothing can be expected from the uneducated and semi-educated members as regards the administration of schools, so the administration must be entrusted to the Education Department.

A certain fixed portion of the income of the District Boards should be allotted to rural education as the income of the District Boards is mainly derived from the labour of the cultivators.

QUESTION 3.—DEMONSTRATION AND PROPAGANDA.—(a) Successful demonstration farms run by private persons and co-operative societies are the best means of influencing and improving the practice of cultivators, because our conservative agriculturists will never like to change their old methods so long as they do not see the actual results of improved farming with their own eyes. For this reason the Government and the District Boards must give adequate help to people desirous of starting agricultural farms. By doing this a number of useful demonstration farms can be started in every district and tahsil. I had a scheme for this work, but, unfortunately, the Board of Agriculture of the United Provinces could not see its way to support it.

QUESTION 4.—ADMINISTRATION.—(c) (i) I am not satisfied with the Agricultural and Veterinary services, because they are understaffed.

(ii) The railways should provide adequate goods sheds and should charge lower freights for agricultural seeds and implements.

QUESTION 5.—FINANCE.—(a) Co-operative societies are the best source for the better financing of agricultural operations, but they can satisfy only the needs of men of limited means. For bigger operations such as sinking of tube wells and drainage Government should be more liberal. I think the *taccavi* system is injurious to the poor cultivators as they are never able to get the full amount of the money borrowed by them.

QUESTION 6.—AGRICULTURAL INDEBTEDNESS.—(a) (i) The cost of production has greatly increased. The expenses of cultivation are daily and monthly, whereas the return is only six-monthly and quarterly; so the cultivators have to borrow money for their daily needs. Litigation is another important cause of the indebtedness of the tenants.

(ii) Chiefly the village *mahajans*, and a small portion is supplied by co-operative societies.

(iii) Bad harvests; decrease in the average production per acre.

(b) Expansion of co-operative societies.

(c) In our Province the cultivators have not the right of selling and mortgaging their holdings except in the permanently settled districts.

QUESTION 7.—FRAGMENTATION OF HOLDINGS.—Under the existing conditions, the consolidation of holdings is very difficult and it can have no far-reaching effect, as even a nice consolidated holding cannot last for more than a generation and is bound to become subdivided unless the law of primogeniture is introduced in some form or other.

QUESTION 8.—IRRIGATION.—(a) (i) The Lower Ganges Canal which runs through the Fatehpur district irrigates only portions of the southern part of the district, and the rest of the district is left untouched. This portion also requires irrigation badly. If the canal is divided into two branches near Bindki it will be very useful, and a much larger area will be irrigated by this means. It may be objected that there will not be sufficient water for the two branches of the canal, but if the method which I suggest under the heading (b) (ii) is adopted, I am sure nearly double the present area will be easily irrigated by means of canal.

(b) (ii) When the canal water is not needed it is simply wasted. If this water may be allowed to fill up the tanks by means of canal distributaries it may serve a very useful purpose, and new tanks may be constructed at suitable places where this water may accumulate.

(iii) Cultivators and zamindars may be encouraged to build *pucca* wells jointly, because a well can very easily and conveniently be used by more than one cultivator at a time. Last year I induced a number of members of my co-operative societies to build *pucca* wells jointly, and long-term loans have been advanced to them.

The officers of the Canal Department have not any great regard for the needs of cultivators, and this is most probably due to their lack of knowledge of agriculture. So it will be advisable if they get some training in agriculture also.

(b) About 50 per cent. of the water of the canals is simply wasted because the cultivators have not the slightest regard for the economy of water. Generally flow irrigation is in vogue here and the cultivators simply let the water into their fields and they are over-flooded, with the result that excess of water damages the crops. If irrigation by means of lift is made compulsory, there will be no wastage of water, because no one will lift more water than is actually required. The water thus saved may be utilised in the new branch canal which I have suggested already.

At the tail-end of each and every distributary the Canal Department should try to have a tank or *jhil*, and if that is not possible the department should construct dams for this purpose. By this means the excess water which is generally let out into ravines will be accumulated and used by cultivators in times of need.

QUESTION 9.—SOILS.—(a) (i) Thousands of acres require drainage cuts in this district very badly. The introduction of canals has stopped the natural outlets in many places, so the work of drainage should be performed by the Canal Department and District Boards. It will considerably increase the area of culturable land, and this, too, will be irrigated by canals, and thus the income from irrigation will also increase.

(ii) Alkali tracts can be improved by sowing wild leguminous plants and by making ridges to accumulate water in those tracts. I have succeeded in converting hundreds of acres by this means, and at present I am doing this work in the districts of Lucknow and Fatehpur.

(iii) Erosion can best be prevented by making strong ridges.

(b) In my own villages in the Fatehpur district I have succeeded in converting hundreds of acres of alkali land by sowing *babul* and other leguminous plants.

(c) I do not think it is needed, at least, in my district, because such plots provide fodder which is becoming more and more scarce.

QUESTION 10.—FERTILISERS.—(a) The use of natural manures as well as artificial fertilisers is very desirable, but natural manures are much more suitable for a poor country like India. The supply of natural manures can be greatly improved by using wood for fuel instead of cowdung cakes.

(c) Demonstration farms are the most suitable means for this purpose.

(d) Not in my district.

(f) Plantations of *babul* and other quick-growing trees should be encouraged.

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QUESTION 11.—CROPS.—(a) (i) It can be done by better tilling, manuring and selection of good seed.

(ii) New fodder crops should be investigated and the Government farms should supply the seeds wherever possible and they must be advertised. Experiments should be made in Government farms to find out the most successful crops. The Agricultural Department may publish small leaflets about them and distribute them to the general public. Special attention should be paid to research on drought-resisting fodder crops and those that may be grown in the dry season.

(iii) As far as possible this work should be done by the co-operative societies.

(iv) In this district the wild animals are not in very large numbers, but monkeys are in very large numbers, and they cause very great damage to agriculture, so they should be exported to hilly tracts where there is vegetation but no cultivation. I have referred this matter to the United Provinces Board of Agriculture.

QUESTION 12.—CULTIVATION.—(i) The existing system of tillage is very defective, because the country plough simply tears the land and does not overturn it, which is very essential. Proper tillage can be achieved by using improved ploughs at the proper time.

(ii) The ordinary cultivators sometimes sow a number of crops together which is undesirable and should be discouraged. They generally know well the advantages of rotation of crops.

QUESTION 14.—IMPLEMENTS.—(a) Indian cultivators are generally very poor and their holdings are very small, so it is useless to try to introduce costly and complicated machinery among them, but a great deal can be done by way of improving the existing implements. They can be easily introduced through co-operative societies, and in my district societies have purchased machinery which they lend to their members.

(b) The chief difficulty in the adoption of new implements and machinery is their high cost, but the Indian cultivators will readily adopt cheap and useful implements when they see them being worked in demonstration farms.

QUESTION 15.—VETERINARY.—(a) There is no harm if the Civil Veterinary Department is brought under the control of the Director of Agriculture.

(b) (i) In our Province the dispensaries are under the control of the District Boards and nothing can be worse than this arrangement.

(ii) Certainly not. Since we have had non-official Chairmen in our District Boards there has been absolutely no expansion. Things are getting worse and worse every day.

(iii) Certainly, because the District Boards have hopelessly failed to perform their duties and they should be placed under the control of the provincial authorities as early as possible.

(c) (i) It is physically impossible for agriculturists to make full use of the veterinary dispensaries as, in a district like Fatehpur with an area of about 1,600 square miles and containing about 5 lakhs of cattle, there are only two dispensaries and they exist only in name as when necessity arises they cannot supply any medicines.

(ii) There is no touring dispensary in this district. It is highly desirable that there should be at least two touring dispensaries in each district. During the last three months several thousand cattle have died of rinderpest and hæmorrhagic septicæmia in this small district of Fatehpur and the local dispensaries hopelessly failed to be of any use.

(d) Sometimes the ignorant cultivators object to inoculation but this objection can be easily removed if there are touring dispensaries and the cultivators see the effect of proper treatment. Most of them have no idea that there are ways and means by which epidemics can be checked and their cattle saved. Most of them regard epidemics as being due to the wrath of

the Gods and think that they can be averted by means of alms and prayers. But practical results will help to convince them.

Certainly, legislation will be useful. Failing legislation, practical experience is the best means of improving the existing conditions.

(e) During the last epidemic of rinderpest and hæmorrhagic septicæmia we could not get any serum for my co-operative societies though I was willing to pay for it.

(f) The ignorance of the cultivators is the chief obstacle and absence of dispensaries both local and travelling makes it impossible for them to get acquainted with the benefits of inoculation.

(g) It is desirable.

(i) & (ii) Both of these are desirable.

QUESTION 16.—ANIMAL HUSBANDRY.—(a) (i) Bulls of good breed should be distributed to the public.

(ii) I started a dairy in Fatehpur city some time ago but I did not succeed as I could not compete with people who sold adulterated milk at much cheaper rates; so in my opinion legislation is necessary to protect the dairy industry. This work can be greatly improved by means of co-operative societies which may borrow bulls for the use of members as well as non-members, from the Agricultural Department. This year the Deputy-Director of Agriculture in charge of Cattle Breeding Operations, has very kindly lent half a dozen bulls to our societies for this purpose.

(iii) Breeding farms should be started along with Government agricultural farms so that pedigree bulls and heifers may be available in sufficient numbers.

(b) Certainly; these are the chief causes of injury to cattle in this district.

(c) Fodder is very scarce from the beginning of February to the middle of April, and from the middle of June till the middle of July, that is, for about 14 weeks in the whole year. Within three or four weeks of the expiry of these periods young growing cattle begin to thrive.

(d) Fodder supply can be greatly improved by making silopits and preserving and storing hay.

(e) Land owners cannot be induced to move forward in this matter unless the Government is ready to support them.

QUESTION 17.—AGRICULTURAL INDEBTEDNESS.—(a) In my district the average cultivator works on his holding all through the year, with the exception of the months of June and February when there is not much work to do in the fields, but he repairs his house at that time.

(b) Dairying and poultry-farming can be conveniently done by farmers along with their cultivation. A successful demonstration of these things will have a very useful effect.

(c) Bee-keeping is not known in this district. Poultry farming is not considered very dignified. Fruit growing offers no obstacles but sericulture and pisciculture are not known here. Lac culture is also not known here. Rope making and basket making are done here. There is very little demand for fruits in rural areas. Still, zamindars are paying greater attention to it.

Small leaflets, in simple vernacular, describing the means and methods of following the above-mentioned industries together with the approximate income and expenditure from them should be published by Government and distributed to the general public gratis or at nominal prices.

(d) Yes. Small pastures should be started for these works with the help and aid of Government. The most urgent need of the peasantry of India is that its raw products should not go out of each district before being manufactured to some extent.

Big factories are not needed in our country at present, but small factories are badly needed. I prepared a scheme for the organisation of such a

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society but unfortunately it was rejected by the Registrar of Co-operative Societies.

There are a number of things which are simply wasted or burnt at present like hemp stems after the separation of fibre, and a number of water weeds and grasses which might be used for making paper pulp, and some indigenous seeds as well from which oil could be extracted, but no attention is paid to them. Special research may be made into these possibilities.

(e) Yes. If small factories for the manufacture of raw produce are started in rural areas they can certainly provide employment for a number of men.

(f) Yes; e.g., finding out a suitable appliance for the extraction of hemp fibre.

(g) Manufacturing of raw produce like the husking of rice, making of dal, etc., can lead to greater rural employment.

(h) Compulsory elementary education is the only means by which people can be induced to devote their spare time to improving the health condition of their surroundings.

QUESTION 18.—AGRICULTURAL LABOUR.—(a) (i) & (ii) The proprietors of land should provide special facilities to the labourers so that they may emigrate to places where they are wanted. The chief causes of the shortage of agricultural labour is that the agriculturists do not employ daily labourers throughout the year.

(b) The people of this Province are not at all enterprising. They are very contented and do not like to leave their houses even if they have a remote chance of inheriting land, it may be only an acre. So in my opinion some change in the law of inheritance is necessary.

QUESTION 19.—FORESTS.—(b) By planting quick growing plants on the sides of the roads and waste lands.

(d) Yes. There is necessity of afforestation and certainly it would stop erosion in the neighbourhood of villages.

QUESTION 20.—MARKETING.—(a) No. There is only one big grain market in my district at Bindki but the roads connected are in a very deplorable condition. The roads should be properly kept and some new roads should also be constructed.

(b) The existing market facilities are very unsatisfactory. But it is impossible to make any great improvement until the general education of the rural population improves; only then can co-operative sale be successfully introduced.

One of the great drawbacks is the multiplicity of weights and measures as in almost every big village the weight of the *Panseri* (five seer weight) varies; it goes from five standard seers to almost nine. In this way it is very easy to cheat poor and ignorant cultivators.

QUESTION 21.—TARIFFS AND SEA FREIGHTS.—There should be no custom duty on hides.

QUESTION 22.—CO-OPERATION.—(a) (i) The Government should try to employ only those officials in the Co-operative Department who have the real spirit of co-operation in them and who may be able to teach the non-officials how they should work in the cause of co-operation. More attention should be paid to sound organisation and adequate supervision than to the rapid expansion of the movement. They should work in a missionary spirit and not as executive officers of the Government.

(ii) The non-officials should be encouraged to take a keener interest in the movement and they should be treated with due courtesy. The effort of the department should be to teach them how to carry on the work and guide them and not to spend its whole time in finding fault with their work.

(b) (i) Credit societies are doing fairly well but there is very little co-operative education among the members and the real spirit of co-operation is lacking. It can be greatly improved by imparting general education to the members.

(ii) Purchase societies require a great and up-to-date knowledge of business.

(iv) There is no need of forming fresh societies of this kind as the credit societies can serve this purpose well and in the Fatehpur district they are doing the work properly.

(vii) Some of the old and strong societies are doing this work in the Fatehpur district on a small scale.

(viii) Such societies are only suitable for those places where there are sufficiently large grazing areas.

(ix) I framed bye-laws for a Better Farming Society, but unfortunately they were not approved by the late Registrar and I dropped the matter.

(c) In my opinion it is not desirable.

(d) Yes, they have achieved their object to some extent.

QUESTION 23.—GENERAL EDUCATION.—(a) The existing system of education is not satisfactory. In my opinion the agriculturists should not be required to attend classes from 10 to 4 p.m. Elementary education should be made compulsory, but the hours of teaching should be between 12 noon and 2 p.m. Two hours a day for elementary education are quite sufficient; one hour for reading and writing and one hour for arithmetic. The chief reason why the agriculturists are afraid to send their boys to the village schools is that the boys will not be able to help them in their work.

In 1910 I made education compulsory among the members of my co-operative societies and all the members used to go and read. Mr. (now Sir S. H.) Fremantle, the then Registrar, had told me that we would get aid from the Education Department, but later on I was told that no aid could be given so long as the school curriculum was not regularly followed.

In these schools education was given only for two hours, from 1 to 3 p.m. I had to close these schools for want of funds.

QUESTION 24.—ATTRACTING CAPITAL.—(a) At present agriculture alone is not very paying and the margin of profit is very narrow; so it is difficult to induce a larger number of men of capital and enterprise to take to agriculture. Besides that, agriculture requires very close supervision and hard work, so people hesitate to take up this profession. But, if by means of demonstration farms and by introducing other branches of agriculture like dairy farming, poultry farming, horticulture and market gardening and cattle breeding successfully, their benefits are shown, people are bound to take up this profession because all the other professions are overcrowded. There is a great scope and great future before agriculture and young men will take it up when they find no other work which is more paying.

(b) Ignorance, short sightedness and a fear of an increase in land revenue are the chief factors which are keeping back the owners of agricultural land from carrying out improvement.

QUESTION 25.—WELFARE OF THE RURAL POPULATION.—(a) Caste prejudice is one of the causes of the wretched condition of the peasantry. Although the question of untouchability is not very strong in this Province, low-class people like Chamars, Pasis, Khaticks and others are not treated properly. In almost every village we find the worst locality occupied by the low-class people who are not allowed even to draw water from good *pucca* wells. The result of all this is that they are the easiest victims of the various epidemics like cholera, malaria, influenza and plague. The rate of mortality among these people is also greater, with the result that the scarcity of labourers is being keenly felt in villages now. So the zamindars should be forced to give good land to low-class people for building houses and for wells.

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It is an admitted fact that India is one of the poorest countries in the world. The low standard of living of the vast majority of its people is well known. It is a pity that with such a vast culturable area and with the majority of its people living on agriculture, they are so ill-fed, ill-clad and ill-housed. Many of the educated Indians, and even some Englishmen, have ascribed this abject poverty to the huge economic drain from this country, due to foreign rule. But I do not agree with them. If we study this interesting problem more deeply we will find that we ourselves are not free from blame and we can improve our condition to a great extent by our own effort.

The chief reason for our poverty is the blessed habit of contentment. We are satisfied with whatever we get and the spirit of enterprise is almost totally dead in us. The majority of the rural population want to stick to their homes and are most unwilling to leave their villages unless they are compelled to do so. They prefer to reduce their expenditure and lower their standard of living to going to some other place and adopting some other profession.

Our laws of inheritance are greatly responsible for this state of affairs. Take the case of the majority of the zamindars or cultivators of these places. The sons of farmers or of the majority of the zamindars do not dream of taking up any independent profession. They think that they have got something to fall back upon and they must inherit something after some time so they need not exert themselves to learn a profession. The result is that they continue to rot in their native places. We see a number of cultivators who have hardly got one full acre of occupancy holding. They take sub-leases of small holdings from other cultivators at high rents, with the result that their condition is growing worse every day. In the same way we see holdings of the families of big zamindars dwindling into petty *zamindaris* of annas and pies. So it is highly essential that suitable remedies should be found.

England would have never been so great if its early inhabitants had thought fit to stick to their homes. What is needed in us is the spirit of enterprise and adventure, and this can be greatly brought about if the law of primogeniture is introduced everywhere and only the eldest son may succeed to the landed property of his father. Then, and only then, will the other sons think of adopting independent professions and of increasing their incomes by immigrating to other places. It can be seen everywhere and every day that those people who have chosen to leave their homes and settle elsewhere are much better off. The law of inheritance seems to be the fundamental cause of the poverty of our country, and it has killed the spirit of enterprise and adventure in us.

APPENDIX.

Copy of a letter, dated, Fatehpur, April 16, 1926, from Rai Ishwar Sahai Bahadur, Chairman District Co-operative Bank, Limited, Fatehpur, to the President, Board of Agriculture, United Provinces (through the Magistrate and Collector, Fatehpur, and the Director of Agriculture, United Provinces).

"Herewith I beg to forward to you a copy of the scheme which the Board of Directors of the District Co-operative Bank, Limited, Fatehpur, passed at their quarterly meeting held on April 12, 1926, for your favourable consideration and orders."

CO-OPERATIVE AGRICULTURAL DEMONSTRATION FARMS.

As the real aim and work of the co-operative societies can never be completely achieved without improvement in agriculture and both must

go hand in hand to effectively improve the condition of the cultivators, it seems absolutely necessary to start a number of co-operative agricultural demonstration farms along with the co-operative societies, under the guidance and supervision of the secretaries and other officials of the co-operative societies who may have received adequate training in the improved methods of agriculture.

A beginning was made in this direction by the Fatehpur District Co-operative Bank last year by starting three farms at Fatehpur and at the villages Behta and Chak-askaran, after consulting the Director of Agriculture, United Provinces, who very kindly lent the services of a Fieldman to our district bank. But the work was begun very late as we got the Fieldman in the month of October, 1925. The farms, too, could not be run wholly on co-operative lines as they were under the sole management of three of the Directors of the district bank. Besides that, we found it difficult for one Fieldman to supervise three farms at a distance of about 14 miles from each other.

For these reasons the Directors of the district bank formulated the following scheme at their last quarterly meeting, held on 12th April, 1926, for starting model co-operative agricultural demonstration farms:—

At present there are 75 rural co-operative societies in this district scattered in all the three tahsils. It is proposed to have 8 demonstration farms in this district, two in *pargana* Fatehpur, two in Haswa, two in Aya-shah and two in Bindki.

To supervise these farms we must have at least one Inspector and four Fieldmen. The former should be a B.Ag. and the latter must have at least passed the two-years' course of the Cawnpore Agricultural College. The duties of these Fieldmen and the Inspector will include the secretarial and inspection work of the co-operative societies as well, and we think these duties can be combined without any difficulty. All the expenses of the farm, except the pay of the Inspector and the Fieldman, will be borne by the members of the societies who will start the farms, and the profits will also go to them. The farms will be run by some members of the co-operative societies jointly and, where it is not possible, by individual members. The farms will be located in the best possible situations so that all the members of the co-operative societies, as well as outsiders, will be able to see their working and will be allowed facilities for learning things and getting supplies of seeds and implements through the farms.

As the initial expenses connected with this scheme will be too much to be borne by the district bank or the societies concerned, Government aid to the following extent is absolutely necessary:—

The Government should be requested to pay at least Rs.300 for each farm for the purchase of necessary implements, and also the full pay of the Inspector and the Fieldmen in the first year, three-quarters of the pay in the second year, half in the third year, and one-quarter in the fourth year. In the second and subsequent year the balance of the pay will be paid by the district bank because by that time the Inspector and the Fieldmen will have learnt to supervise the work of the societies also. We hope that in four years' time they will be thoroughly acquainted with the bank work and will be able to take the places of some of the members of our present staff. During this period the proprietors of the farms will also be in a position to contribute something towards the pay of the men who will supervise their farms.

The following is a rough estimate of the amount of money which will be required for this purpose, and we hope that the Board of Agriculture will kindly agree to give us the necessary amount.

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The pay of the Inspector will be between Rs.75 and Rs.100, and that of the Fieldman between Rs.40 and Rs.50. The average pay of the Inspector will be Rs.90 per month, and that of each Fieldman Rs.45 per month.

	Rs.
Initial grant of Rs.300 for eight farms	2,400
Pay of one Inspector and four Fieldmen in the first year	3,240
Pay of one Inspector and four Fieldmen in the second year	2,430
Pay of one Inspector and four Fieldmen in the third year	1,620
Pay of one Inspector and four Fieldmen in the fourth year	810

Oral Evidence.

37,940. *The Chairman*: Rai Bahadur Lala Ishwar Sahai, you have provided us with a note of the evidence you wish to put before the Royal Commission. Is there anything you wish to say in addition to that, or are there any corrections you would like to make?—I saw from the Questionnaire that questions affecting revenue were not to be dealt with, and so I did not say anything on that subject; but I see from his evidence that the Revenue Secretary has touched on it, so I would like to bring to your notice the real condition of affairs in my district.

37,941. We are quite prepared to hear your views in that direction up to a point?—I merely wish to put in this report. (*Document handed in.*)

37,942. This is entitled "Government Gazette of the United Provinces of Agra and Oudh, Saturday, July 22, 1916, Part VII," and you have marked page 747. Do you wish to say anything further about this?—No, I merely wish to bring it to the notice of the Commission.

37,943. If you will leave it with us, I will have it put on the Members' table. There are one or two points in your note I should like to clear up. In your answer to our question on agricultural education, you give it as your view that a larger number of students would be prepared to take advantage of any increased facilities for agricultural education?—Yes.

37,944. But elsewhere you say, "The attendance at these classes is not sufficient because neither students nor their parents know the advantages of scientific agriculture, and there are no prospects for them after receiving agricultural education." Do you think that the last fact (if it is a fact) suggests there is any demand for increased facilities?—There ought to be more schools, yes. When there are more schools in different districts more people will get to know their value.

37,945. In answer to our question on agricultural indebtedness you say there has been a decrease in the average production per acre?—Yes.

37,946. On what do you found that view?—My own experience is that we are not having the yields we used to get.

37,947. For how many years does your accurate recollection of farming on the same land carry you back?—About thirty.

37,948. Are you prepared to tell the Commission that the yield from that land is less now than it was thirty years ago?—Yes.

37,949. Can you give us exact figures, or are you speaking from general impressions?—From general impressions.

37,950. *Sir Thomas Middleton*: Has the land become salt?—No. In some places where there is canal irrigation it seems to be a little alkaline.

37,951. *The Chairman*: Dealing with irrigation, you say that if lift irrigation were made compulsory there would be no wastage of water. It is, of course, a fact that where cultivators have to expend their personal labour

in lifting the water they are more careful how they use it, but I take it you would not suggest that all flow irrigation should be stopped?—I think so, because the more water we can save for irrigating other land the better.

37,952. You think it would be a practical and useful step to do away with all flow irrigation and to arrange for the cultivator to lift the water to his land by his own or bullock power?—Yes, or by small pumping plants.

37,953. You say on the same page that alkali tracts can be improved by sowing wild leguminous plants and by making ridges to accumulate water in those tracts, and you say you have converted hundreds of acres by these means and are at present employing them. Can you give us further details? Was this land definitely salt?—Yes.

37,954. What wild leguminous plants did you sow?—*Babul*, and a small plant called *Chakauri*.

37,955. They will grow on alkali land?—Yes.

37,956. Did you think of inviting the Agricultural Department to witness these experiments?—Mr. Moreland has seen them.

37,957. Did you undertake this work on your own initiative or at the suggestion of the department?—When he was on tour in the district he saw it; that is all.

37,958. On page 470, you refer to the possibility of extending the activities of the Co-operative Department in this Province to cattle breeding. Are there any cattle-breeding societies in your district?—No. I have had bulls on loan from the Agricultural Department and distributed them.

37,959. Have you taken an active part in the co-operative movement?—Yes. I think I was the first man in all India to start rural co-operative societies.

37,960. What is your connection with the movement at the moment?—Now I am Chairman of the Board of Directors.

37,961. On page 472, Question 23 (a), you point out that you succeeded in making education compulsory in one of your societies?—Yes.

37,962. That must have been rather difficult? How do you compel the members of a co-operative society?—I told them that they must join the schools at a convenient time.

37,963. On page 473, you make an interesting proposal for co-operative agricultural demonstration farms. I think this scheme was considered by the Provincial Board, was it not?—Yes.

37,964. With what result?—I am a member of that Board, but I am sorry to say I could not attend that meeting.

37,965. So that your advocacy was lacking and your recommendation was rejected, was it not?—Yes.

37,966. Is it your view that such demonstration farms could be conducted at a profit, or at any rate without loss, or would they cost a certain amount?—At the beginning they would cost a certain amount, but not in two or three years.

37,967. You think ultimately they might be self-supporting?—Yes.

37,968. I note that you advance certain proposals for zamindars' co-operative mills and credit societies?—Yes.

37,969. And also for co-operative better-farming societies?—Yes.

37,970. I think you went so far as to formulate the by-laws. Did you yourself draft those by-laws?—Yes.

37,971. Did you submit those to the Registrar of Co-operative Societies in this Province?—Yes.

Rui Bahadur Lala Ishwar Sahai.

37,972. What was the result?—The zamindars' co-operative mills and credit societies and the better-farming societies were rejected by the Registrar; but the new Registrar visited Fatehpur this month; he quite agreed with me, and said he was ready to approve the by-laws.

37,973. Has he approved them yet?—Yes.

37,974. He has approved them in writing?—No, not in writing, but he has discussed the matter with me and cleared away all the matters of doubt entertained by the late Registrar, and he has said they are all right, that he agrees with me, and he has suggested my sending in a formal application for registration. I am going to do that.

37,975. But you have not heard from him yet to say that he definitely reverses the decision of his predecessor?—No, but he promised to register them.

37,976. So you understood?—Yes.

37,977. *Sir Thomas Middleton*: You point out that fodder is very scarce in certain periods of the year?—Yes.

37,978. You have told us that by exercising a little judicious authority you have produced compulsory education. Do you think you could induce people to make silage and to store fodder in your area?—But I do induce them and they do collect ample fodder, when there is ample.

37,979. It is scarcity of fodder that is the trouble?—Yes.

37,980. You point out that the chief reason for the poverty of the people is the blessed habit of contentment. Does not that also apply to their treatment of the cattle? They are content with what nature gives?—Yes.

37,981. *Raja Sir Rampal Singh*: You want to abolish the control of the District Board over primary education?—Yes, and have it under the Education Department.

37,982. Do you think that will be advantageous?—Then somebody will take care of it; now the District Board takes no care.

37,983. *Sir James MacKenna*: I understand there are religious objections to killing monkeys in India?—Yes.

37,984. So that you would have to deport them?—Yes, I think so.

37,985. I understand a dead monkey is more valuable than a live one in some countries; have you heard that theory?—Yes, it may be.

37,986. But, of course, there would be religious objections to killing them in India, I think?—Yes. That religious objection does not prevail in Burma.

37,987. *Mr. Kamat*: You have said in your memorandum that a change in the law of inheritance is necessary?—Yes.

37,988. And that the present law is the fundamental cause of the poverty of the people?—Yes, I think so.

37,989. Do you think the time has come to have this radical remedy in India?—Yes, I think so.

37,990. If out of four or five sons the eldest only inherits, are there occupations, other than the land, for the other sons?—Yes, there are.

37,991. You think there are enough occupations in India, other than agriculture, for the rest of the population?—Yes, there are.

37,992. And such a proposal would not evoke any serious opposition from the general public?—It may do so, but it is necessary, I think.

37,993. You still think the legislatures or Government should undertake this change in the law of inheritance in the immediate future?—Yes, I think so.

37,994. *Sir Ganga Ram*: How much land have you got?—I have got a few villages, but my own cultivation is in two villages.

37,995. How many acres are there in your total property?—I cannot tell you the number of acres; it may be about 50,000 acres.

37,996. Of which, how much is canal irrigated?—Only two villages are canal irrigated.

37,997. Is there the possibility of a new canal being constructed there?—Yes.

(The witness withdrew.)

The Commission then adjourned till 10 a.m. on Friday, the 11th February, 1927.

Friday, February 11th, 1927.

CAWNPORE.

PRESENT :

The MARQUESS OF LINLITHGOW, D.L. (*Chairman*).

Sir HENRY STAVELEY LAWRENCE, K.C.S.I., I.C.S.	Sir JAMES MACKENNA, Kt., C.I.E., I.C.S.
Sir THOMAS MIDDLETON, K.B.E., C.B.	Mr. H. CALVERT, C.I.E., I.C.S.
Rai BAHADUR SIR GANGA RAM, Kt., C.I.E., M.V.O.	Professor N. GANGULER. Mr. B. S. KAMAT.

Mr. A. W. PIM, C.S.I., C.I.E., I.C.S., } (*Co-opted Members*)
Raja Sir RAMPAL SINGH.

Mr. J. A. MADAN, I.C.S., } (*Joint Secretaries*)
Mr. F. W. H. SMITH.

Mr. C. Y. CHINTAMANI (Editor, The Leader) Allahabad.

Note on Agriculture under the New Constitution.

I am not an agriculturist. My knowledge of the subject is derived from occasional study in the course of a publicist's life and supplemented by what I saw as Minister of Agriculture in the United Provinces for 28 months.

No action that the Government of India may take is likely to be of much service to agricultural improvement in the Provinces, owing to the conditions of the Constitution. The one big exception to this statement is the maintenance by them of an institution like the Pusa Research Institute. Agriculture being a Provincial and Transferred subject, action has to be taken by "Governors acting with Ministers." A sympathetic Governor, a liberal Finance Member, a capable Minister, a wise Legislative Council, and a head of the department willing to work in harmony with the Minister and the Council: these are the necessary factors so far as the State is concerned. It goes without saying that adequate funds should be provided year by year. I am of opinion that the resources of the United Provinces Government are inadequate to their requirements. The financial relations between the Central and Provincial Governments call for revision so as to leave to the latter resources commensurate with their responsibilities. It is in this direction and not in the form of grants or subventions that in my view we should look to the Central Government for relief. As things are, I think it should be possible for our Provincial Government to make increased allotments for agriculture by the observance of economy (chiefly) by the Governor in Council in the Reserved sphere. I have little doubt that the Legislative Council will vote larger demands for grants if it is satisfied that the money will be wisely spent. The Council was severely critical when I was Minister. It was rightly so. Under that stimulus we were able to reduce wasteful and unprofitable expenditure, to enforce economy, and to reform policy in relation to demonstration farms and gardens, while deficiencies in the staffing and equipment of the College of Agriculture were supplied, the School of Agriculture at Bulandshahr was opened, the agricultural engineering branch was strengthened, the two cattle farms in Muttra and Kheri were placed under the department, and more Indians

were appointed to high offices in the department. We decided to open another agricultural school in the eastern districts and to increase the number of Circles under Deputy Directors, but were held up for want of funds. Further, it was decided on the unanimous recommendation of a strong committee presided over by the then Senior Member of the Board of Revenue and including the Directors of Agriculture and Public Instruction, to make the College of Agriculture a University institution, and we were planning steps for the training, partly at the College and partly at the Government Botanical Gardens at Saharanpur, of Indians for the positions of Superintendents and Overseers of gardens. I do not know that anything has since been done in the furtherance of these objects. Nor do I know the reason why.

The point I wish to emphasise is that Agriculture should be, in name and in reality, a matter for Provincial Governments responsible to Provincial Legislatures, that it should be so more than at present, and that its development will be best helped by the provision of adequate funds out of provincial revenues and to be voted by Legislative Councils and not by the transfer of control, in any manner and to any extent, to the Central Government.

Arrangements for research should be made, and in my view can be made in the Provinces.

I am glad that there is to be no more recruitment for the Indian Agricultural Service under the control of the Secretary of State. Provincial Governments should be the authorities to determine what posts should be created or maintained, how they should be recruited for, and what should be the conditions of salary and service. If suitable men cannot be had in India, they will naturally try to get them from abroad for such work, for such periods and on such terms as they may deem fit. As the Government will be responsible to the Legislative Council the latter is not at all likely to assume an attitude of hostility. Trust it, inform it, argue with it, and it will be responsive and helpful. While it has been severe in criticism of extravagant and unfruitful expenditure, it has been loud in complaining of inadequate outlay on so vital a subject.

Irrigation, Loans to agriculturists for purposes of agriculture, and Forests should be transferred to the control of Ministers. I do not believe a word of the allegation that efficiency will thereby suffer. Appoint competent men as Ministers, and let them do their work with the support of the Legislative Council, and they can give as good an account of themselves as Members of the Executive Councils. In these Provinces as well as in Bombay and the Punjab Ministers were translated to Executive Councils. In their present positions they have charge of certain subjects. Would they have been unfit to look after them as Ministers? Owing to the absurdities of the Constitution they would have been held to be so. The attitude of the Legislative Council demonstrates that it would be more friendly to transferred than to Reserved subjects as it can then exercise some control over policy, expenditure and administration.

Oral Evidence.

37,998. *The Chairman*: Mr. Chintamani, you are good enough to appear before us this morning. We have a note from you for which we are obliged. Would you mind telling the Commission what positions in public life in this Province you have held which have given you an insight into agricultural matters?—I have been Editor of a daily paper for the last 17 years. I was a Minister for a little over two years. I have been connected with various public organisations. I cannot say they are positions which gave me an insight into agricultural problems in particular but generally into public questions.

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37,999. So you have viewed agriculture as a man generally interested in public affairs and in the public welfare?—Yes.

38,000. I wanted to ask you one or two points on that branch of our subject which seems to specially interest you. You are impressed, I understand, by the value which Pusa has rendered as a Central Institute for agricultural research, is that so?—Yes.

38,001. You think Pusa has done good service?—I think so.

38,002. Have you considered at all the problem of post-graduate training for agricultural officers in India?—The training can be imparted in Pusa as well as in provincial institutions.

38,003. Is that a subject to which you have applied your mind?—Not in particular.

38,004. You probably agree that the quality of teaching required for post-graduate courses must necessarily be a high one?—Yes.

38,005. You probably agree also that the association of higher teaching with research is of mutual advantage?—Yes.

38,006. However, you yourself, as do most other people, accept the present position following on the Reforms according to which the Provincial Government is responsible for agriculture and normally under the Constitution agriculture is a subject transferred to a Minister responsible to the local Legislature?—Yes.

38,007. And you argue from that, I understand, that in the main development in research and in propaganda must be under the control of Local Governments?—Yes.

38,008. And you think that there are still certain directions in which further saving of public revenues might be effected with a view to diverting that revenue to agricultural matters?—Yes.

38,009. Do you live in the country at all yourself?—No.

38,010. Have you studied the co-operative organisation?—Yes, in the same manner as agricultural matters.

38,011. Have you formed any view about the state of the co-operative movement in the United Provinces?—Yes; it is not quite satisfactory.

38,012. But we hope these ailments are passing and that the future may be brighter?—I should think so.

38,013. Have you formed any view as to the extent to which the co-operative principle may further the interests of agriculturists in the Provinces? Have you studied the problem?—There must be more co-operation between the Co-operative Department and the Department of Agriculture than there is at present. Lately the Local Government appointed a committee to go into the whole question and make recommendations. I understand that the committee's report is now under the consideration of the Government. One respect in which the Co-operative Department has suffered is that the appointments to that department have to be made from the Revenue Department. The Registrar, the Deputy Registrar and the two Assistant Registrars must be revenue officers, either I.C.S. Officers or listed post holders or Deputy Collectors. None of them is ever taken from the Department of Agriculture, and it is not open to the Local Government to go outside the Revenue Department to make the appointments. Whether the men are satisfactory or not they have to be taken from the Revenue Department. I think there should be less departmentalism and the Government should not be tied by rules made in the interests of particular services.

38,014. *Sir Henry Lawrence*: What are these rules?—They are that the Registrar and the Deputy Registrar must belong either to the I.C.S. or must be holders of listed posts.

38,015. Who has made those rules?—The Secretary of State. Also that the Assistant Registrars, I do not know by whom this rule was made, must be Deputy Collectors.

38,016. These rules appertain to this Province, do they?—I think in other Provinces too the Registrar is an I.C.S. man or the holder of a listed post.

38,017. Can you refer us to any such rules made by the Secretary of State?—I have not got the text of the rule with me. But I can tell you the things as they exist here. When they created the post of Deputy Registrar, they announced to the Legislative Council that the post was reserved for members of the Indian Civil Service. It was in 1921 that the Secretary of State sanctioned the listing of these two posts. Since then it has been said that provided two other posts are given to Deputy Collectors who are "listed" these two posts may go to the I.C.S. At all events no one outside the I.C.S. or P.C.S. cadre has ever got the posts, and under the existing practice, based upon rules, no one else can be appointed.

38,018. *The Chairman*: We can very easily get precise information from either the Government or the department concerned?—I may say that when I was Minister I wanted to appoint, as Assistant Registrar, a non-official gentleman who has done particularly good work in the co-operative movement, but I was told that I was not at liberty to go outside the ranks of Deputy Collectors.

38,019. Have you had experience of local authorities in this Province?—I have not been a member of the local bodies, but the same observation holds good; I have been a student of their affairs as of other affairs.

38,020. What is your view of these District Boards as an instrument for controlling education?—It is not very satisfactory as they are.

38,021. Why not?—In the first place they are not expert bodies; in the second place the District Boards have come under non-official control only recently, during the last three or three and a half years.

38,022. Most of these District Boards have educational sub-committees?—They have.

38,023. Have you ever considered the possibility or the advisability of Government having the power to nominate certain persons in the district to the educational sub-committee?—I do not think there will be any advantage in that.

38,024. You do not think that might strengthen the educational sub-committee?—The committee may be given power to co-opt.

38,025. *Sir Henry Lawrence*: Have not they got that power now?—I am not quite clear about it.

38,026. *The Chairman*: Do you think that the educated Indian living in urban surroundings and the great cities in this country understands the rural problem?—Fairly, but not with the thoroughness of an expert.

38,027. Do you think that more might be done in Universities, for instance, to encourage interest in rural economics?—Yes, I think so.

38,028. Would that be an important contribution to public life?—Yes; and I must say that in recent years much more attention has been given to economics by Universities and this has been very fruitful in producing very capable men.

38,029. *Sir James MacKenna*: Just one point on a matter of administration as you have been a Minister. You are aware of the Central Cotton Committee in Bombay, and you know the way in which it finances or assists an enquiry in the Province? The point was put by one witness that there was a certain danger in this, in that the Minister might rather object to a grant for a particular object in which he and the Legislative Council have

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no final say. Do you think there is anything in that?—As the Local Government does not spend the money, and the money comes from outside, I do not think any objection has arisen so far. At all events, no such question has arisen here.

38,030. That point was raised as probably being a theoretical difficulty?—So far as my knowledge goes, it is merely theoretical; there has been no practical difficulty so far.

38,031. *Mr. Kamat*: You are against the principle of receiving any assistance from the Government of India for agricultural improvements in the Province?—Yes.

38,032. Is that because you are afraid of the control or interference by the Government of India, or is it due to any other principle?—It is partly because there is the fear of interference or control and also partly because it does not fit in with the system of provincial autonomy towards which we are working and with the present system of financial relations between the two Governments.

38,033. You say that the financial relations call for a review; can you briefly indicate in what directions the revision should take place?—The Local Governments should have more revenues raised in the Province for expenditure in the Province than is at present the case.

38,034. If the Province reaches the limit of exploring the avenues of raising funds and if the Government of India can help, are you still against that help?—If there are Provinces which have reached the limit of taxation, and if the maximum revenue that can be raised on the present basis is inadequate for the requirements of those Provinces, that is a case more for the revision of financial relations between the two Governments, for a reconsideration as to which source should be Provincial and which All-India, than for special subventions or grants.

38,035. Under the present arrangement there is the Board of Agriculture and there is also the Agricultural Adviser to the Government of India? As an ex-Minister can you tell me from your own experience whether you had anything like interference from the Agricultural Adviser, or whether you had any recommendations of the Board of Agriculture sent to you which were in the nature of interference in local affairs?—Nothing was done which could be called interference. I do not remember any advice being received from the Agricultural Adviser to the Government of India during the time I was in charge of the Department; nor even from the Board of Agriculture. But a recommendation of the Board of Agriculture made before the introduction of the reformed system of Government was still pending consideration at the time the new system was introduced and that recommendation was one with which I agreed on its merits; but since then effect has not been given to that particular recommendation of the Board of Agriculture in spite of the efforts to the contrary.

38,036. *Sir Henry Lawrence*: What was the recommendation about?—The recommendation was that, just as is done in Bombay and elsewhere, the agricultural colleges should be made University institutions, and degrees in agriculture should be instituted.

38,037. You tried to get that done and you did not succeed?—Yes, I tried.

38,038. Are you on the Senate of the University?—No; but it was not the University that stood in the way. It was the Government who did not do it.

38,039. *Sir Ganga Ram*: By Government do you mean the Governor and his Minister or the Governor in Council?—The formula is "the Governor acting with his Ministers," and it is not for me, an outsider, to say whether it was the Minister, the Governor or anybody else that stood in the way.

38,040. *Mr. Kamat*: Supposing the Provinces receive assistance from the Central Government unconditionally, that is to say, without the least apprehension of interference, would you still be against that sort of system?—I cannot conceive of any Government giving away the taxpayer's money to another Government or to anybody else unconditionally. If I were a member of the Legislative Assembly, I should strongly object to the Central Government giving any money to a Provincial Government or to any other body without any condition or stipulation.

38,041. You realise that there should be a co-ordinating agency in the Central Government to co-ordinate research or some such work in all the different Provinces?—What do you mean by the word co-ordinating?

38,042. Either a body like the Board of Agriculture or a similar body specially constituted with a view to bring research matters into co-ordination in order to prevent overlapping?—If it is only to give advice to Local Governments after consideration by that central board I have not the slightest objection; on the other hand it may prove beneficial. But if it is to be something more than advice, if it is to be anything in the nature of control, I should certainly object.

38,043. You object to any co-ordinating agency at the Central Government in the form of an Agricultural Development Commissioner or Secretary, Central Advisory Board, or some such body coming into the Province and seeing on what lines your research work is being done, and then discussing and giving advice in such matters? But if it is mere advice you would not object, would you?—Provided the word advice is not a euphemism for control. May I say a word more with regard to that? I would invite the attention of this Commission, if I may, to the memorandum submitted by Sir John Hewett, a former Lieutenant-Governor of these Provinces, to the Royal Commission on Decentralisation. There he wrote from his own experience of the manner in which officers like the Inspector-General of Irrigation, the Inspector-General of Forests, the Director-General of the Indian Medical Service, although in theory they had no control over Local Governments, still reacted upon the Local Government's liberty of action, and I think he used language of bitterness which I have seen no agitator use.

38,044. Now about recruitment: are you in favour of provincialising all research? Research would doubtless require the best of experts and probably these experts would have to be recruited? Do you think that such recruitment should be done by the Local Government under the Lee Commission's recommendations?—By the phrase "provincialising research" I should not be understood to mean that I am opposed to the Government of India having a Central Research Institute with any number of officers according to their choice. Central Research institutions are even now a central subject and I cannot conceive of any Provincial Government having any objection whatsoever to any men being taken by the Government of India for that purpose; but officers for research purposes to be appointed in a Province and paid out of provincial revenues must be appointed by the Provincial Government and not by any other authority.

38,045. With regard to this question of recruitment, another witness, I think it was the Director of Agriculture, told the Commission that there is a dearth of experienced workers for the problems connected with plant breeding and crop improvement; that this is traceable in part to the long delay in deciding on what basis permanent recruitment to the higher posts should be made; and that the question is still unsettled and the rules delegating powers to the Local Government are being re-considered by the Secretary of State. As a publicist have you any idea as to what questions still remain to be settled and what are the rules with reference to the delegation of powers to the Local Government which the Secretary of State is reconsidering?—I cannot possibly tell you anything about that;

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possibly somebody in the Government might be able to give you the information.

The press does not know? . . .

38,046. As an ex-Minister what idea have you formed about the Indians who are connected with research? Have they the capacity, the talents, and are they of the required calibre for such work?—Given the proper men there is no question of race. A competent Indian is as competent as a competent European.

38,047. And you think that the whole of the research work could eventually or should eventually be done by Indians in the Agricultural Service here?—Certainly.

38,048. How long do you think the department would have to depend upon foreign experts for research?—I should say until the date when the most junior officer now in service is due to retire.

38,049. As soon as that takes place you would Indianise the whole of the research department without any fear whatsoever?—I would Indianise it, no doubt, but I would put it in this way: I would leave the control entirely to the Local Government, who ought to have the power of bringing from abroad a person for any purpose for which one in this country is not available. I would not let the interests of the country suffer because an Indian was not available: if that were the case I would unhesitatingly go in for an outsider whoever he was.

38,050. Are the Indians who are interested in research work being given the fullest opportunity at the present moment in the Department?—I cannot say.

38,051. Irrigation, you say, should be a Transferred subject, and you have no fear that efficiency in that direction would suffer?—Not the slightest fear.

38,052. We have been told in one or two Provinces that the time has not yet come for Irrigation to be made a Transferred subject. You do not agree with that, do you?—From that point of view the time never will come.

38,053. *Mr. Calvert*: Is your view based on experience, or is it just a guess?—It is neither a guess nor is it based on experience; I should say that it is based on commonsense.

38,054. Just a vague guess?—No, I do not say it is a guess: I am much more confident than one making a guess would be. As things are at present in this Province we have a Chief Engineer in charge of Irrigation who is an Indian; then there was also not long ago an Indian Under-Secretary; and there are several Superintending Engineers in the Irrigation Branch who are Indians. I cannot imagine that, merely because the Member of the Government in charge of the subject is called a Minister and not a Member of the Executive Council, efficiency will suffer: I simply cannot conceive of such a thing.

38,055. *Mr. Kamat*: Would there be no fear that in the case of big irrigation projects the Legislative Council, for political reasons, would not countenance such schemes?—It is most unlikely, because, generally speaking, it was the Legislative Council and Indian public men who had to put pressure upon the Government to speed up irrigation works, and you, Sir, as a public man would doubtless vouch for that. As a matter of fact, it was only in connection with the Sukkur Barrage Scheme that there was an acute controversy between the Government and the Legislative Council owing, I believe, to a belief among a number of the Members of the Legislative Council, that the financial results would not be satisfactory. The most recent big irrigation work in these Provinces was the Sarda Canal Project, and the Legislative Council passed the scheme without the slightest

difficulty. Again assuming that the Legislative Council were inclined to create any difficulties, which could be done whether irrigation were a Transferred or a Reserved subject, in the latter case the Governor can exercise his power of certification, but I have not yet seen any Governor recklessly using his powers of certification.

38,056. With regard to your remarks in connection with local bodies, have you considered whether their difficulties about finances are not real?—Which local bodies?

38,057. District and Local Boards?—I have made no remarks about that.

38,058. You were asked a question a little while ago as to what was your opinion about the District and Local Boards, and you said that they were not quite satisfactory. Now, if they are not quite satisfactory, I ask you whether that is not partly due to the fact that they have not got sufficient funds?—Yes.

38,059. And most of the meagre funds at their disposal perhaps is allotted to communications, schools, etc., whereas agriculture is kept in the background?—The functions of the Municipal and District Boards are divided into two parts, obligatory and optional. There are certain things which the Board must provide for, and it is incumbent on them to spend money on such things, and there are certain other things, of which agriculture is one, on which it is optional for the Board to spend money, so that naturally according to the rules of the Boards so much money is not spent on agriculture as is spent on those subjects which are obligatory on the part of the Boards.

38,060. *Sir Henry Lawrence*: Is agriculture an optional function of the Board?—I think so.

38,061. *Mr. Kamat*: And so also are veterinary dispensaries?—I am afraid I could not tell you.

38,062. *Mr. Calvert*: I have just one question to ask you. When you were Minister was any attempt made to make provision for research into animal diseases?—I do not remember.

38,063. Were you, as Minister, responsible for the Bulandshahr School?—Yes.

38,064. *Professor Gangulee*: During the tenure of your office as Minister you organised what I think was known as the Provincial Development Board? Could you tell us what were the functions of that Board and how it worked?—To co-ordinate the activities of the various departments of the Government connected with economic development. Heads of Departments such as Agriculture, Irrigation, Public Works, Industries and Forests, were members of the Development Board. The Senior Member of the Board of Revenue was the Chairman of the Board. The Board met only twice while I was Minister, and since then it has not met. I speak subject to correction there, but I gathered the other day in the Legislative Council that the Board had ceased to function.

38,065. To what do you attribute that?—Lack of interest on the part of the Government.

38,066. And on the part of the heads of departments?—That means the Government.

38,067. Were there any non-officials on the Board?—Not a single one. It was intended to be a departmental body. The idea was that when the head of a department found himself confronted with a problem for the solution of which the assistance of another department was required he should bring it before the Board. Where problems required the co-operation of two or more departments they were to come before the Board, and the Board would evolve a programme which, after receiving the sanction of Government, would be binding on the departments concerned.

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38,068. There was no representative of the Legislative Council on the Board?—No.

38,069. Have you any suggestions as to how such a body might be developed?—The intention was to secure full co-operation in common problems between, say, the Agricultural and Co-operative, Forests and Industries, or Industries and Agricultural departments.

38,070. It was to be a correlating agency?—Yes.

38,071. Its functions would be purely advisory?—Yes.

38,072. Would you be in favour of placing a special fund at the disposal of this body?—No funds were, in fact, at its disposal. Sir Harcourt Butler (the Governor who sanctioned the creation of this body) and myself were both of opinion that it was desirable to watch the progress of the Board during its initial stages carefully, and then decide what developments could be made. But first the Governor and then the Minister responsible disappeared, and then the Board itself disappeared also.

38,073. If you had another opportunity to constitute such a body, how would you set about it? In addition to the heads of departments, would you have some non-official members?—Probably, but I would not like to commit myself without giving further thought to the matter. In view of our experience with the last Board, however, I think a non-official element would be a safeguard for its continued existence.

38,074. During your tenure of office as Minister you felt the necessity for such a body to correlate the activities of the departments concerned?—Yes.

38,075. Do you know how things are progressing at the school at Bulandshahr since you left the Ministry?—I have heard conflicting accounts. I have heard non-officials express dissatisfaction, but the head of the department (in whom I have great confidence) has expressed a very favourable opinion. On the whole, I am inclined to think the results are favourable.

38,076. You have not been able to pay a visit to that school since you left the Ministry?—No. It has been no part of my functions.

38,077. What has happened with regard to this proposal you refer to in your note, to make the Agricultural College a University institution? I take it you wanted to affiliate the College to the University?—The intention was to make it an integral part of the University of Allahabad, which is a teaching and residential University. It still has an affiliating side, but that is soon to disappear. In the University Act, however, there is a provision that technical and agricultural institutions, although not situated within the limits of the city of Allahabad, may yet form part of the teaching and residential University of Allahabad, suitable arrangements being made. The committee to which I refer in my note made a recommendation in that sense which was accepted by Government, and a public announcement was made that steps would be taken to make the institution a part of the University. I do not know what happened after that, but no progress has been made.

38,078. You think it would be desirable for the Agricultural College to be given a University status?—Yes.

38,079. Were you connected with the Co-operative Department when you were Minister?—Yes.

38,080. That was one of your portfolios?—Yes.

38,081. What is the position of the co-operative movement in this Province?—So far as I am able to understand it, the position is that there is a large number of societies, but they are not well organised or strong. I

think in the initial stages there was a desire to multiply the number of societies rather than consolidate the position gained, with the result that there have been many liquidations and probably the societies have become more moneylending agencies than truly co-operative institutions. In the end Government set up a committee to inquire into the whole matter and make recommendations, and those recommendations are now under consideration by Government. One difficulty has been the lack of adequate non-official agency; there has not been a sufficient number of competent non-officials interested in the movement to give it strength, and so far as the department itself is concerned there has been more of the spirit of departmentalism than of co-operation.

38,082. Why are the non-officials in this Province not taking an interest in the movement?—They take some interest, but not enough. I hope their interest will grow.

38,083. Do you see any signs of it growing?—I hope it will. I cannot be more positive than that.

38,084. *Sir Henry Lawrence*: The Agricultural, Co-operative and Veterinary Departments were all under you when you were Minister?—Yes.

38,085. Do you consider you received sufficient revenue to spend on those departments?—In the first year there was no difficulty, the financial position of the Government being quite satisfactory. In the second year there was great difficulty, and in the third year even greater difficulty; we had to curtail our programmes very considerably for want of funds.

38,086. Can you tell me approximately how many lakhs were being spent on those subjects at that time?—I will not commit myself to any figures, but I think some figures are given by the Director of Agriculture in his memorandum.

38,087. The budget this year is nearly 30 lakhs; can you tell me how much it was before the Reforms came into force?—16 to 20, I think.

38,088. It has nearly doubled?—It includes non-recurring as well as recurring items.

38,089. Still, the expenditure from provincial revenue has nearly doubled?—But there has also been an increase in the resources open to the Local Government under the new system.

38,090. Can you tell us roughly what has been the increase in the resources of the Local Government during these six years?—I think Mr. Pim can tell you better than I can.

Mr. Pim: I cannot give the figures.

38,091. *Sir Henry Lawrence*: The budget last year was 13 crores. When you entered the Ministry it was about 7 crores; now it is 13?—That does not mean a net increase of 6 crores, because out of this the contribution to the Government of India has to be paid.

38,092. That contribution has been reduced?—Yes, during the last two years.

38,093. By how much?—By a little over a crore.

38,094. Taking those figures, out of an increase of six crores the increase in the amount spent on agriculture has been anything from 10 to 15 lakhs. In your opinion, is that a satisfactory allocation?—I do not think it is possible to give an absolute answer to that question. If there were to be a sudden increase of half a crore or a crore in the amount allotted, the department would not be able to spend it properly. I would rather the question were put in this form: "What is the amount the department is able to spend profitably and economically in a particular year? Would that

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amount be available or not?" If the Finance Department can give to the Minister of Agriculture the amount he can profitably spend on agriculture, the position is satisfactory; otherwise it is not.

38,095. While your revenues under Government have increased from 7 to 13 crores, the expenditure on the department has increased from 16 to 30 lakhs; is that correct?—The increase is not net; many deductions have to be made from that 13 crores. There is the obligatory grant to the Famine Insurance Fund, the contribution to the Government of India, interest on debt and other things.

38,096. Have not these deductions been decreasing over this same period of six years?—Only the contribution to the Government of India; not the other items.

38,097. That decreased by 1½ crores?—About that.

38,098. So that the net position of the Government has been very largely improved in these years?—The payments on account of interest have increased a great deal; the Government borrowed four crores of rupees in 1921 for the Sarada Canal and other works. They also spent out of that loan money on buildings costing over Rs.50,000; if a building costs Rs. 50,000 or more, it has been arranged that the money can be found from the development loan.

38,099. What I want to get from you is whether in your opinion agricultural interests have received sufficient attention. You speak of schemes having to be curtailed, but meantime the financial position of the Government was improving. Why should you have had difficulty in getting your schemes carried through?—The financial position of the Government was precarious in 1922, in spite of the increase in revenue.

38,100. You were satisfied you got all the money you could expect?—I was not satisfied; I do not think the head of any spending department is ever satisfied; but it would not be just to the Financial Department to say they were overflowing with money and refused to give it to us. There was financial difficulty in 1922 and 1923, leading to new taxation. If you want an answer to the general question of whether I think the Agricultural Department has, in all the circumstances of the case, received fair treatment, I should say, "Yes, tolerably fair treatment." It is quite possible it might have got more had there been retrenchment in certain other departments, but I should be sorry to commit myself to the proposition that it was unfairly treated; the Financial Department was anxious not to be unfair. Nor should I like to commit myself to the proposition that it was generously treated.

38,101. If we are to have a further development of agricultural research and demonstration, more money must be expended on these purposes. Have you any suggestions to make as to the directions in which this increased revenue should be sought?—The Local Government might obtain it by a gradual decrease of the expenditure in certain other departments, where I consider it is too high; but I would not hesitate to go in for new taxes if I found that, in spite of all adjustments, enough money was not available for development purposes.

38,102. Can you indicate where the new taxes should fall?—That would require detailed consideration. Moreover, as I have indicated in the first part of my memorandum, the whole basis of the financial relations between the Central and Provincial Governments requires reconsideration.

38,103. You are not prepared at the moment to suggest where additional taxation should fall?—No, nor am I prepared to recommend it at present, because I am not at all satisfied that the Governor in Council has effected all the economies which I believe to be possible.

38,104. Then I observe that your revenue now from excise is about 1½ crores?—Yes.

38,105. Do you contemplate the disappearance of that revenue?—Not the disappearance, but the reduction.

38,106. You are not an advocate of prohibition?—No.

38,107. Do you think that is a policy that is morally indefensible?—I do not care to commit myself to answer that question; I certainly think it is an utterly impracticable policy, and that is enough for me.

38,108. But you actually wish to see a reduction of that revenue?—Yes, but not for the sake of reducing the revenue, but in order to reduce the consumption.

38,109. Cannot you get a greater revenue with a decreased consumption?—That effort has been made as far as possible in this Province, and I do not think we can go further in that direction.

38,110. You were Minister for Excise, were you not?—Yes; the increase of duties was so heavy that I think any further increase would be very unwise.

38,111. Would it lead to illicit distillation?—There is illicit distillation even now, but it would increase considerably.

38,112. *Sir Ganga Ram*: When you were in charge of agriculture, do you think there was sufficient technical control over the expenditure incurred in that department?—Control by whom?

38,113. The other day in evidence it was stated before us that the estimates for tube wells were not checked by anyone because there was no one above the officer in charge having sufficient knowledge of technical matters. What precautions did you take to see that the money of the public was not wasted, and what control did you exercise over the officer in charge?—The controlling authority over him is the Director of Agriculture.

38,114. The Director of Agriculture denies having any technical knowledge on the subject?—He did not deny it to the Government.

38,115. He has said so before us?—I do not know what he said before you. The Agricultural Engineer never addressed the Government direct; he never can; whatever the Agricultural Engineer does is through the Director of Agriculture.

38,116. I particularly asked the Agricultural Engineer who checked his estimates; he said there was no one possessing sufficient technical knowledge to be able to check them. Is that so?—The Director of Agriculture is his superior; he has to approve what the Agricultural Engineer does.

38,117. I daresay he decides whether a tube well is required or not, but there is something beyond that. The zamindar who provides the money expects that his money will not be wasted?—The zamindar himself sees that his money is not wasted.

38,118. Why does he go to you?—For technical assistance, and he also gets an advance.

38,119. Who controls the technical part of it?—Besides the Director of Agriculture, there is no engineer above the Agricultural Engineer.

38,120. What steps did you take to see that the money of the zamindar was not wasted?—Whatever steps a lay member of the Government could take; that is all.

38,121. *The Chairman*: Is there no audit of these accounts?—There is an audit of all these things. In the beginning there was not; but at some point or other the last word must be left with some officer.

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38,122. *Sir Ganga Ram*: The auditors cannot deal with the technical side. At least you should have asked the Agricultural Adviser to call for tenders, or, as a responsible Minister, you ought to have seen that the rates were correct by calling for tenders from other companies?—I daresay.

38,123. Is not that correct?—I do not know; I daresay; I take the idea from you.

38,124. And yet you want to convert Irrigation into a Transferred subject?—I should like to say that before Agriculture was a Transferred subject, precisely identical arrangements were in force under the Lieutenant Governor; it was not that when Transferred subjects were invented and Agriculture was included among Transferred subjects, the Minister of Agriculture came upon the scene to remove technical control or to do away with precautionary steps that had been in vogue.

38,125. But at that time the Lieutenant Governor had Secretaries who were technical men?—He had no technical Secretaries.

38,126. Not in agriculture, but he had in other departments?—The Secretary for Agriculture was an Officer of the Indian Civil Service who was Secretary for many other departments, and the self-same individual continued as the Secretary for Agriculture after I became Minister.

38,127. You recommend that Irrigation should become a Transferred subject?—Yes.

38,128. In that case, who would exercise control over the technical side of it?—Whoever is now exercising control when irrigation is a Reserved subject.

38,129. In that case would you revive the office of the Inspector General of Irrigation?—No.

38,130. Then who would do it? Formerly the Inspector General of Irrigation, who was a very senior officer, passed the technical part?—I am not entitled to put a question, but I should like to know who controls it now when irrigation is a Reserved subject.

38,131. At present there is a period of transition?—I say it will remain as at present; it will not be anything more unsatisfactory.

38,132. Moreover, may I point out that in many cases irrigation schemes concern more than one Province; the taking of water from natural sources sometimes affects two or three Provinces. As long as it is a Reserved subject, the supreme Irrigation Officer knows what projects come before him from various Provinces?—They would still know if it were a Transferred subject; there would be nothing to prevent them knowing.

38,133. For instance, supposing you sanctioned a scheme such as that of the Sarda Canal, and that scheme affected the Punjab as well as this Province, if it were a Transferred subject, you would sanction it without reference to the Punjab Government?—We cannot; the moment the Irrigation Officer is informed that the interests of another Province are also concerned, he will take steps to ascertain the position as it affects the other Province before making any decision.

38,134. *Mr. Kamat*: Is not the Public Works Department in charge of a lay Minister as a Transferred subject?—Yes.

38,135. Is there any technical control which he can exercise?—The Chief Engineer is the last authority.

38,136. *Sir Ganga Ram*: You say the staff of the Co-operative Department could have been replaced by Indians?—I did not say that with reference to the Co-operative Department, where the staff is Indian already.

38,137. You said that the staff could be got from outside?—I said from outside the ranks of revenue officers.

38,138. Did you mean without impairing the efficiency?—Even increasing the efficiency.

38,139. It will increase the efficiency?—It may. My proposition was this: at present the Government is tied down by rule to selection from the Revenue Department; I say they should not be so tied down; they should be at liberty to select the best available man whether he did or did not belong to a particular department.

38,140. You say you have little doubt that the Legislative Council will vote larger demands for grants if it is satisfied that the money will be wisely spent. What is the meaning of that? What precautions would you propose in order to satisfy them that the money is wisely spent?—Explanations given by the Department and the Government to the Legislative Council. I can illustrate my meaning by reference to one or two concrete cases. In 1920, it was decided by the Lieutenant Governor to purchase land near Meerut for 10 to 12 lakhs of rupees and to set up a cattle breeding farm; it was still a proposal; it had to go through the Legislative Council as part of the Budget of 1921. The Legislative Council was extremely unfriendly to the proposal, and it was postponed. The Director of Agriculture and I went to the spot, saw it, ascertained local opinion, and then the Director of Agriculture himself advised the Government not to go forward with that scheme, to drop it, and place the cattle breeding farms not under the Veterinary Department but under the Deputy Director of Agriculture in charge of cattle breeding. Now in that case if the Legislative Council had not been critical, 10 or 12 lakhs would have been spent upon the acquisition of that land, and more money might have been spent upon opening a cattle breeding farm there, whereas it was all found to be unnecessary and the Legislative Council was found to be quite right.

38,141. Are you aware that in order that your Province should be correctly described as protected from any chance of scarcity you want at least to protect 10,000,000 acres? Have you any idea how it could be done?—Mainly by wells.

38,142. At the rate of progress at which you have been constructing wells it would take 400 years?—Yes, but it is not necessarily tube wells everywhere.

38,143. Then what wells?—Ordinary wells.

38,144. You think there is scope for ordinary wells; are the zamindars capable of doing it?—I think so.

38,145. Without any help from Government?—Government does help.

38,146. But at this rate it would take 400 years?—Yes; we all advocate more speedy progress.

38,147. But how can Government help without any resources? You do not advocate any increased cess or taxes?—I am not opposed to it when the conditions present themselves for a new cess or a new tax. Suppose to-morrow a new tax or cess is imposed and a certain amount of money is realised, unless it is proposed to make a free gift of that money to the zamindars and tenants to make wells, then it will be necessary to secure the co-operation of the zamindars and tenants, who should spend part of their own money.

38,148. Have you canal schemes in view?—I have not; I have not been in charge of irrigation.

38,149. *Professor Gangulee*: The tube wells in this Province are sunk by Government subsidy?—Yes.

38,150. Do you approve of that system?—For the present I do, but I contemplate the time when there shall be no subsidy, but private individuals

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shall do it with their own money. At present Government help is required to popularise the construction of tube wells.

38,151. *Sir Ganga Ram*: You said that the District Boards have duties some of which are obligatory and some optional. Is the making of communications obligatory?—Yes, to the extent of their resources.

38,152. If it is obligatory, then some scale must be laid down for all obligatory duties?—The only scale is the financial possibilities.

38,153. I understand that obligatory duties must be specified; that is to say, it must be specified what percentages of their funds must be spent on hospitals, education and communications. What is the rule in this Province?—The whole of the finances of the District Boards are spent on these objects.

38,154. But in what percentages?—It varies from district to district.

38,155. Have the communications improved since the Reforms?—I do not see any connection between the introduction of the Reforms and communications; if you are speaking of cause and effect, I see no connection; if you are referring to coincidence of time, they have not improved.

38,156. I ask your opinion as you have been observing the political trend; have the communications, which it is our duty on this Commission to consider, improved; have the District Boards spent a sufficiently large proportion of their grants on communications?—The District Boards are spending whatever they can; much more than they can spend is required.

38,157. *The Chairman*: There is no hypothecation of a particular percentage of revenue to a particular object?—No.

38,158. *Sir Ganga Ram*: You must, of course, recognise that whatever recommendations this Commission may make, it will involve additional expenditure, will it not?—I do not know; I recognise nothing; I do not know what the Commission will do.

38,159. What I want to ask you is, can you suggest any ways and means for the Government to carry out the recommendations of this Commission?—I do not know what those recommendations are. There have been recommendations of Commissions which we have done our best to frustrate.

38,160. I will put to you a concrete example. Supposing the salt tax were doubled, would you support it?—No, I would not. I should like to add that the salt tax, whether it is doubled or trebled, will not come to the Provincial Governments, and unless this Commission is going to recommend that agriculture should be a central subject under the Government of India I do not see what connection there is between the salt tax and the recommendations of this Commission.

38,161. *Sir Thomas Middleton*: You informed us that when you were Minister you made an attempt to affiliate the Agricultural College to the University of Allahabad. Can you tell me whether that would have involved any considerable change in the curriculum of the College?—No, not necessarily.

38,162. May we take it that the addition to the cost would not have been great?—I do not think there would have been any addition to the cost at all on account of the affiliation. Affiliation by itself would not have involved any cost. If, on the other hand, after affiliation, the course was stiffened or extended, or the University insisted upon better laboratories, better equipment, and if there would have been an increase in the cost, it would have been met.

38,163. Was there any fear that there might have been a considerable increase in cost? Was that question discussed?—I do not think so. I think it is rather the opposition of the department to come under the control of the University which has stood in the way.

38,164. You have told us that you look forward to a time when the personnel of the Agricultural Department shall be completely Indian?—I say it should be completely recruited by the Local Government.

38,165. I judged from your answer to Mr. Kamat that your view was that the staff should be largely or entirely Indian born?—Yes, to the largest extent possible compatible with efficiency.

38,166. Now, granting that Indians will have naturally just as good qualifications for research work in agriculture as the British or the Americans or French or Germans, would you agree with me that the experience of all these countries has shown that in order to train up useful workers a long and extensive training is required?—Yes, I agree.

38,167. The point I was coming to is this. Each of your Indian Provinces requires a number of specialist workers. But the number in each Province is quite small, two to three workers on a particular subject. For example, at the present time you are thinking of getting an Economic Botanist, and you might want two or three Economic Botanists in this Province. Vacancies will arise at rather long intervals, therefore your individual need for Economic Botanists will not be large. But if you were to pool all the requirements of the Indian Provinces for men of that class, the demand would be substantially larger and would be fairly steady and a scheme for training would be a much easier matter for India as a whole than it would be for any individual Province. Now, do you think that there should be co-operation between the Indian Provinces for the purpose of training men?—I have no objection to that.

38,168. Would you even go so far as to co-operate with the Government of India?—I would co-operate on equal terms always, but not on the principle of subordinate partnership.

38,169. If you could see a scheme for training men made applicable to the whole country you agree that it would be desirable and that all Provinces might well co-operate in it?—I should consider such a proposal on the merits without any prejudice whatever.

38,170. *Raja Sir Rampal Singh*: Before you were Minister were these demonstration farms, &c., controlled by the Government, running at a loss?—Yes, they were.

38,171. Did the Legislative Council in those days raise objections?—It did.

38,172. Did you take steps to economise the expenditure?—Yes.

38,173. And now they are running at a profit?—Yes, so I am told.

38,174. *Mr. Kamat*: With reference to the co-operative movement in your Province, in answer to one of the questions you said that the non-official element here did not take sufficient part?—I said there was not a sufficient number of non-official workers.

38,175. To what do you attribute that? Is it due to the system of landlords and tenants or is it due to any backwardness of general education and lack of public spirit?—It is due to general backwardness. Public spirit is less widely diffused than in Bombay. I should also lay a part of the responsibility at the door of the department. The Co-operative Department has been running like any other bureaucratised department and not with a spirit of enthusiasm and missionary faith.

38,176. Do you mean to say that the Co-operative Department is running more or less mechanically like a wooden department, without much zeal for the welfare of the people?—I do not say that it does not care for the welfare of the people. It has got its Registrar, Deputy Registrar, Assistant Registrars and so on, just like Tahsildars and others; it is all departmentalism.

38,177. *Professor Gangulee*: Do you think that public opinion in this country is ripe for compulsory primary education?—Yes, it is ripe.

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38,178. Do you think there is demand for it?—It is not active; but it is one of those things where the supply creates the demand.

38,179. Do you think the District Boards are adequately interested in compulsory primary education?—They are interested, but they are financially very weak. An Act has been passed, but none of them has yet enforced it.

38,180. Do you think the educated people of this Province are willing to tax themselves for attaining this end?—Yes; but they must first be satisfied that every rupee of the money now collected in taxes is put to profitable use and that there is no extravagance or unnecessary expenditure.

38,181. *Sir Ganga Ram*: You say in your note that competent men should be appointed as Ministers. You know the principle on which the Ministers are appointed is that they should have a sufficient following; it is the democratic principle?—Yes; that is all on paper. I think Ministers have been appointed, at least in some cases, merely according to the personal whims of the Governor.

38,182. I hope that was not the case with you?—It was so in my case. It was not that I was appointed Minister after the Governor had ascertained what following I had in the Council. He wanted to appoint me, and he appointed me.

38,183. *The Chairman*: Is it your view that one effect of the Reforms has been to quicken public interest in agriculture?—Yes.

38,184. Do you think discussions on agricultural subjects in the legislature have helped to attract public interest?—Yes; the Legislative Council is keenly interested in them.

(The witness withdrew.)

Messrs. A. B. SHAKESPEAR, C.I.E., J. G. RYAN, NOEL DEERR, representing Indian Producers' Association, Cawnpore.

Replies to the Questionnaire.

QUESTION 1.—RESEARCH.—(a) The Indian Sugar Producers' Association is of opinion that research into agriculture generally should be an Imperial matter and that this should be under the control of one centralised body. If, however, this control be located at Pusa, it will be necessary greatly to augment the staff. The policy under which the work is carried on should be directed by the Imperial Government working through a Central Advisory Board of Agriculture associated with the Member-in-Charge, and as regards the results of research, this body would work with the Departments of Agriculture of the several Provinces.

It should not be left to the Provincial Governments to decide what work is to be attempted. The Imperial Government would, of course, remain in touch with the Provincial Governments, but if each Province has its own research organisation, there is danger of much overlapping and duplication which will be avoided with one centralised authority. The Association is of opinion that research into agriculture should study the traditional methods pursued by the Indian cultivator and build up its improvements upon these traditions, as it is obvious that the 3,000 years' accumulated experience of the Indian agriculturist must contain elements of value which should not be overlooked by the Western expert.

(c) In the industry which the Association represents it advocates an extension of research into:—

(1) The various diseases of fungid origin to which the sugar cane is subject, and

(2) The insect pests which attack the sugar cane.

Under (1) should be included the breeding of canes immune or resistant to disease and under (2) the study of the prospects of introducing the "natural method" of plant pest control.

QUESTION 2.—AGRICULTURAL EDUCATION.—(i) As regards the Provinces of Bihar and Orissa, and to a less degree the United Provinces of Agra and Oudh, the Association is of opinion that more institutions and instructors are needed. Reference is not made to such costly institutions as the Agricultural College at Cawnpore, as this can only appeal to a very limited number and cannot reach the great majority of the small cultivators. It is believed that a certain amount of decentralisation would be more effective, and that the establishment of a greater number of demonstration farms would have a much greater influence. The officials in charge of such farms should be individuals who have both sympathy and influence with the small cultivator.

The Association advocates the establishment of one centralised sugar school to operate for the whole of India, at which Indians may be taught the principles underlying sugar manufacture. The school should form a post-graduate course and should only be open to students who have already taken the B.Sc. Degree.

(ii) The Association recommends an increase in the number of trained field instructors who will be in close contact and sympathy with the small cultivator. The Association is also of opinion that an extension of agricultural service is possible by cinema propaganda and by the distribution of leaflets in the vernacular written in very simple language.

In the sugar industry attention is called to the necessity of impressing on the cultivator the benefits he will derive from planting cane from selected disease-free seed, and this is one of many points where, in this particular industry, benefit would follow from an increase in the number of trained field instructors who will come into close contact with the cultivator.

(iii) Not necessarily, but the syllabus of primary education should, in agricultural areas, include elementary agricultural instruction.

QUESTION 3.—DEMONSTRATION AND PROPAGANDA.—(a), (b) and (c) The experience of the Association as regards the sugar industry in Bihar and Orissa and in the United Provinces has been that the ryot is inherently conservative and is slow to adopt any development outside of his traditional routine. The Association is also of opinion that close personal contact with individuals who enjoy his confidence will be effective in persuading the ryot to depart from tradition, and any individuals who are charged with this duty should be familiar with the ryots' psychology and mental processes.

The necessity of intimate association with and mothering of the ryot is shown in the following actual conversation:—

Q. Do you know Government has provided better varieties of cane than that which you are now growing?

A. Yes, I have been told so.

Q. Why do you not get them?

A. The Government farm is many miles away. I cannot go there.

Q. If the canes were given you, would you grow them?

A. Yes, if Government were to send some one with these new canes, I would plant them.

A further suggestion would be to operate through the headman of a village or group of villages carrying out demonstrations on land leased for short periods from the actual cultivator, and a demonstration of this nature

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may possibly appeal to the ryot more intensively than a demonstration on a Government farm.

(d) The Association wishes to instance in particular the success in extending cultivation by ryots and the adoption of new varieties of sugar cane by the ryots which has already taken place at the Dowlatpore Agricultural Concern, in the district of Darbhanga, under the management of Mr. C. Atkins.

QUESTION 4.—ADMINISTRATION.—(c) (ii) and (iii) This subject is dealt with in the reply to Question 20, marketing.

QUESTIONS 5 AND 6.—FINANCE AND AGRICULTURAL INDEBTEDNESS.—The Association advocates the extension of the Co-operative Banking system and the enlargement of the existing powers of such banks.

All possible means should be used to free the ryot from the bondage of the village moneylender and full use should be made of the Usurious Loans Act.

The Association suggests that consideration should be given to the introduction of legislation aimed at limiting the right to mortgage immovable property, except to recognised banks and credit institutions.

QUESTION 8.—IRRIGATION.—(a) The Association would draw attention to the districts of Champaran, Muzaffarpur and Darbhanga in North Bihar, where it believes that the Chota Gundak, the Bagmati and other small rivers could be utilised, and if so that the production of the areas which could be commanded from these sources of water could be much increased.

In the areas mentioned above there exists a series of lakes formed by the old bed of the Chota Gundak, all of which might be used as reservoirs for water and, in addition, it appears likely that by the construction of dams in this area, further supplies of water might be stored and distributed during the dry season before the break of the monsoon.

The obstacles which exist to the extension of irrigation in the above mentioned areas are:—

(1) Prejudice. It has been generally held that the use of irrigation will lower the fertility of the soil and reduce its water holding properties and at the same time induce the rise of injurious alkali. While the last mentioned might happen with only occasional irrigations, the Association does not anticipate harm from this cause with systematic irrigation.

(2) Small holdings and the difficulty of other than riparian holders obtaining access to the sources of water.

(3) Except in isolated cases, the individual holder of land has not the means to command even the very moderate capital required.

It may be added that the Association believes that crops in general and the sugar cane crop in particular would be very materially increased in this area if water could be supplied during the period March 1st-June 15th, the date at which the monsoon is expected to break in this area.

QUESTION 10.—FERTILISERS.—(a) Yes. In the districts with which the Association is most familiar in Bihar and Orissa and the United Provinces of Agra and Oudh, the use of artificial fertilisers is nearly non-existent and the practice of pasturing livestock by allowing them to roam over the country side results in the loss of all the urine and most of the solid excreta. In villages of any size, we are inclined to believe that a community scheme for the conservation of night soil and refuse, combined with the "Adco" process of nitrogen fixation, would have a reasonable prospect of success. The ryot is unfamiliar with the use of artificial manures, and to persuade him to embark on their use, demonstrations of their benefit would have to be made in such a way that the benefit to be obtained would be patently visible to him. A danger to the successful use of artificial

manures would be that the ryot might easily be led to suppose that their application was the be all and end all of cultivation, whereas, the better the cultivation the more pronounced will be the advantage to be gained from their use.

(b) The application of an act similar to the Food and Drugs Act to the sale of fertilisers with exemplary penalties for fraudulent adulteration.

(c) Demonstration on lands belonging to cultivators, the demonstration being made at many localities and arranged in such a way that the results are directly apparent to the cultivators.

(d) On the sugar properties operated in Bihar by Messrs. Begg, Sutherland & Co., Ltd., and by the Japahat Sugar Company.

(f) The establishment by Government of depots at which coal could be purchased at reasonable rates and the further exploration of the possibilities of introducing an oil stove to take the place of the present open hearth.

The Association is in entire agreement with the evidence recently given before the Commission by Mr. C. M. Hutchinson,* lately of the Imperial Research Institute, Pusa.

QUESTION 11.—CROPS.—(a) The Association advocates the extension of the work already in progress in breeding new varieties of grain crops, sugarcane, &c. As regards sugarcane, the Association believes that the work already done has been and continues to be of great value to the community. While the ryot has been somewhat slow to make use of this development in the case of sugarcane, he is in Bihar and Orissa and in the United Provinces now beginning to show interest, and the Association anticipates a great extension of the new varieties of sugarcane produced at Coimbatore.

QUESTION 12.—CULTIVATION.—(i) Yes, by the adoption of deeper ploughing; but this involves the necessity for improving draught cattle to haul the more powerful ploughs which would then be essential. It also connotes the desirable extension of the use of power tractors in the case of large holdings.

QUESTION 13.—CROP PROTECTION, INTERNAL AND EXTERNAL.—(i) The Association advocates a system of plant quarantine and the prohibition of the importation of plants of any nature, except through the agency of a department which should be under Imperial control. This would necessitate the establishment of a quarantine station (or stations) where imported plants would first be grown under strict control and not issued until a clean bill of health be assured.

(ii) The Association advocates a system of internal quarantine, and where the existence of a pest or disease is known in any area, the export of seed from that area should be prohibited. It suggests the organisation of a body of travelling crop inspectors in this connection.

QUESTION 20.—MARKETING.—(b) No. As regards the marketing of *gur*, the Association is of opinion that the grower of the cane is the individual who receives the least benefit. It is believed that his legitimate profits are largely absorbed by village moneylenders, in transport, and by middlemen and brokers. As a possible means of reform, the co-operative marketing of *gur* by villagers or groups of villagers under Government direction at the outset might be considered.

As regards the marketing of sugarcane, that is to say, its purchase by central factories, the Association advocates that every facility be given to the laying down of privately owned tramways.

At the present time there is direct evidence to show that District Boards, so far from affording these facilities, place almost insuperable difficulties in the way of the construction and development of private tramways. The Association desires to record the instance of the District Board of Durbhanga

* Vide Bengal Volume of Evidence.

in dealing with the enterprise of the Ryam and Lohat Sugar Companies in laying down light lines at their own cost along the road sides to serve their factories.

Not only were these companies compelled to agree to pay a royalty of one anna per ton on all cane carried over the tramways they constructed, but they were further compelled to undertake the whole cost of the up-keep, not merely of their lines, but of the cart and carriage road alongside which they ran. Representations that the tram lines actually saved the roads from damage by the heavy cane traffic, which would otherwise be carried in ordinary bullock carts on these roads, were entirely set aside, and the factories and ryots alike were penalised by this unfair charge for road maintenance, which naturally increased the cost of transport on the one hand and reduced the price of the cane payable to the ryot on the other.

The general improvement of the roads in practically all sugar-growing districts is urgently called for. The present condition of the existing roads precludes any consideration of mechanical transport, while the entire want of suitable roads in many districts prevents the establishment of factories for dealing with sugarcane.

QUESTION 21.—TARIFFS.—In the case of the sugar industry the reply is not only in the negative, but it is necessary to emphasise that the present import tariff on sugar is of benefit to the cultivator of sugarcane.

The Association views with considerable apprehension the implied recommendation of the Indian Taxation Enquiry Committee, as contained in paragraph 145 of their Report, that the present import duty on sugar should be reduced.

If this is given effect to, an immediate check will be given to the development now proceeding in the sugar industry, and it is highly probable that the cultivation of sugar in India, the importance of which has been recognised by Government, will be endangered.

Oral Evidence.

38,185. *The Chairman*: Mr. Shakepear, you are Chairman of the Association of Indian Sugar Producers. Mr. Noel Deerr, you are Sugar Technologist, and Mr. Ryan, you are the Secretary of the Association?—(*Mr. Shakepear*): Yes.

38,186. I think it is to you, Mr. Ryan, we are indebted for the note of evidence upon which you gentlemen have to be heard?—(*Mr. Ryan*): To my committee. (*Mr. Shakepear*): There is one matter outside the written evidence which I would like to say a few words about. I would like to make mention of the Report of the Indian Sugar Committee. The Committee was constituted in 1920, and I would like to say that it has been a great disappointment to the sugar industry that Government has done so very little, in fact, scarcely anything at all, to further the measures that that Committee advocated. We realise, of course, that changes have come over the position since the Committee issued its Report, and I would hesitate to say that everything which the Committee then recommended would now be applicable. But along certain lines the industry has proved that the recommendations of the Committee were well founded, and I would ask this Commission to urge Government to take immediate action in certain directions and devote the necessary funds. We particularly refer to the strengthening of the technical staff at the Pusa Institute by the recruitment of special officers for work on the agricultural side of the industry, such as the study of soils, cane diseases, insect pests and cultivation methods generally, combined with an enlargement in the staff of trained fieldmen and instructors, the establishment of more seed farms, demonstration farms and, what we consider most important, the provision of at least one high altitude nursery for the preservation of new types of cane. With regard to the other

measures suggested by the Committee, some of which I realise involve the setting up of costly and complex machinery, I would recommend that Government be asked to constitute a small committee as soon as possible to which our Association would be able to send a representative, to examine the Sugar Committee's Report and advise as to what modifications should now be made in its recommendations to meet present-day conditions. For carrying out of the Sugar Committee's complete programme a very large sum of money would necessarily be required, and our Association would suggest that to provide the necessary funds a small portion of the revenue now being realised from the import duty on sugar might be set apart for this purpose.

38,187. Are there any particular points in the recommendations of the Indian Sugar Committee which you were thinking of when you said that there were certain recommendations which might not necessarily be applicable or advisable now?—One important point is the Committee's recommendation for the establishment of a large demonstration factory which was to undertake the manufacture of sugar on a commercial scale; that is a very expensive project which would cost, I estimate, about 20 lakhs of rupees, and with the advance that we have made towards efficiency, we do not now consider that it would be necessary to establish such a factory, there being factories in India working on modern lines where any new processes could be carried out under the direction of Government. I think if the Committee's report were to be again examined, it would be found that opinion would be against that particular recommendation.

38,188. In that connection, have you any other important recommendations to mention?—I am not fully satisfied that the establishment of a Sugar Board would be necessary. This was a recommendation made by the Sugar Committee.

38,189. The existing Sugar Bureau was intended to be the germ of the Indian Sugar Board, was it not?—The Board was intended to be a central body for purposes of general control. I think we would secure what is necessary for the industry in the present organisation, if the technical staff at the Pusa Institute was enlarged, as I have recommended.

38,190. You wish the Bureau to be put on a permanent footing and the technical staff to be enlarged?—Yes.

38,191. I think there was a proposal at one time according to which, by means of a cess, the industry itself would assist in financing the Indian Sugar Board or might have assisted in defraying the expenses of the Sugar Bureau? Have you anything to say on that?—We did come forward with that proposal at a time when we thought that Government was not only not going to do anything for us, but was going to take away what had been done, so that we thought it was our duty to come forward and ask that we should be taxed in case Government could not provide the funds or were unable in any way to maintain the work which was being then carried on.

38,192. And why did that proposal break down?—We were led to believe that the matter would be reconsidered and that Government would be in a position to find the necessary funds; also the industry fell on rather evil days, and our members were not then by any means unanimous in wishing to submit to taxation.

38,193. That was one of the principal difficulties, was it not?—Yes, we found that dissensions had crept in.

38,194. Have you anything to say about the cable service?—The present cable service for sugar information is quite satisfactory.

38,195. And this, you think, ought also to be made a permanent organisation?—Yes.

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38,196. I think we have all the information that we require as to the constitution and history of the Indian Sugar Producers' Association?—We represent about 90 per cent. of factory-made sugar interests in India.

38,197. Has your membership been rising or falling?—It has been rising.

38,198. Turning to the note which has been put in by the Committee of the Indian Sugar Producers' Association, I notice that the general trend of the views there expressed is towards the centralisation of research under the Government of India. How do you gentlemen think that any proposal of that sort would work in with the existing facts of the Reforms and of the Provincialisation of agriculture as a subject?—We feel that sugar research work is such a highly technical subject that it should be kept under the control of a central body. It would be really following what has been done so successfully in the island of Java, where work of that nature is not decentralized. The officers of the central organization tour about and obtain opinions, but research and policy are entirely centralized in the hands of one body, and I think we rather feel, at the present stage of our knowledge of the agricultural officers in India, that it might be dangerous if the control of the policy as regards sugar cultivation were to pass into the hands of the Provinces.

38,199. You mentioned a little while ago that you did not now regard the setting up of an experimental factory as necessary or even advisable. Does that mean to give the impression that, on the technical side, you do not wish Government to make any further investigation?—I did not mean that, but I merely wished it to be understood that we have factories established in which the working out of any special processes or systems of manufacture could be conducted without Government having to incur the expense of setting up a costly institution of that kind.

38,200. But you do think that there is need for further research in the technical sphere?—Yes, we hope to go further ahead.

38,201. It is mainly in the botanical and the agricultural fields that you say Government should work?—I think that is the greatest need of the industry at present, except, of course, with regard to the manufacture of the raw sugar of the country.

38,202. What representation, if any, has the grower on your association?—There is no direct representation; they have associations of their own and we work through them. There is an Association of Planters in Bihar, and there are two supplementary associations representing districts in which European growers are working.

38,203. Do you think it possible for your Association to get into closer touch with the grower? It would strengthen your position before the public a great deal, would it not?—Yes; it certainly would, and our Association is open to membership.

38,204. How much would it cost a cultivator to become a member of the Association?—We have got a uniform subscription.

38,205. Do you think that is fair, as between the zamindar and the factory, that he should pay the same subscription?—I do not think it is fair; but it would all depend on the position of the zamindar himself, for he might have very large landed property.

38,206. So that it does not look as though particular pains have been taken to attract the cultivator into the organization?

38,207. Your note deals, on page 498, with the question of marketing, and you start off there by saying that the association is of opinion that "the grower of the cane is the individual who receives the least benefit. It is believed that his legitimate profits are largely absorbed by village money-lenders, in transport, and by middlemen and brokers"?—That is what we are trying to overcome by attracting more cane direct to the factories.

38,208. Would not some representation of the growers on your association and the concentration of a little more attention on the actual problems of marketing by your association both help the cultivator and, in the long run, be in the interest of your manufacturing members?—The members of the association themselves seek to overcome that by attracting sugar cane direct to the factories where the man is paid cash and he gets 100 per cent. of the value of his crop, excluding the cartage. If his cane is manufactured into raw sugar, it has to pass through various channels, and, of course, there is a large proportion absorbed by brokerage and other deductions.

38,209. The notion of organizing the industry from the grower through the distributors to the point of final manufacture and sale is one which is being developed all over the world in many crops, is it not?—We do conform where we can induce the grower to sell his cane. We have made great strides in that direction.

38,210. I am trying to get from you whether you think more might be done by your Association, by propaganda?—I see the point. But, of course, in many cases one has to deal with multitudes of small growers and difficulties present themselves.

I do not suggest they should all be members of your Association, much less of your committee; but if there was one man who could represent their interests on your committee, it might be helpful.

38,211. Do you wish to say anything about the work of the Cane Section at Coimbatore, other than what you have told us in the various memoranda you have provided?—We think it has been admirable. Dr. Barber's retirement was a great loss to India; if he had been able to remain a few more years more valuable work would have been done, but he laid the foundation of the work which has proved so beneficial.

38,212. Have you any members in Madras?—Yes.

38,213. Do they ever complain that the efforts of Coimbatore have been directed to the improvement of cane for Northern India rather than for Madras?—Yes, there was a suggestion at one time they did not receive sufficient attention.

38,214. On page 497, in answer to our question on irrigation, you draw attention to the possibility of irrigating certain areas in North Bihar (Champaran, Muzaffarpur and Darbhanga). Are there suggestions made as a result of technical advice your Association has received from competent engineers?—They are the result of actual work carried out in certain instances.

38,215. The language used suggests that these are projects which have been examined?—They have not been examined by Government.

38,216. Does the utilisation of the water from the series of lakes formed by the old bed of the Chota Gundak involve a lift scheme?—Yes.

38,217. Is the area which would be commanded by such a scheme cultivated by large zamindars?—(Mr. Noel Deerr): No, they are nearly all small landowners.

38,218. Have you contemplated bringing them into some combination to finance a scheme of lift irrigation?—No, because the scheme is so big that it would have to be carried out with the consent and approval of Government.

38,219. Do you suggest Government should undertake the first charge, construct the pumping station and sell the water to the cultivators?—That would be one way of doing it, but the system of land tenure and the difficulty of getting rights of way and access to the water would be so great that it would have to be carried out as a Government undertaking.

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38,220. Government would stand to the cultivator in this lift irrigation scheme in the same way as in the case of canal-carried water?—(*Mr. Shakespear*): Yes.

38,221. You suggest it is a general impression that irrigation will lower the fertility of the soil? On whose part is this prejudice against irrigation?—(*Mr. Noel Deerr*): That is the opinion of many European planters in Bihar.

38,222. What is the origin of that mysterious belief?—The Bihar soils contain a certain amount of alkali. If you irrigate once and then stop you will bring that alkali to the surface; but if you go on irrigating systematically, and combine your irrigation with drainage, you will wash out the alkali and leave the land better than before. One irrigation may do harm, but systematic irrigation is successful.

38,223. On page 498 you tell us something about the difficulties experienced in the construction of light railways. Are those paragraphs founded on one or two instances, or on many more?—(*Mr. Shakespear*): On instances known to us where we have suffered from these experiences.

38,224. I recollect that Mr. J. A. Henry, who appeared before the Commission at Pusa, gave some evidence on this question. I think he wanted to lay a light tramway for the cane season only on District Board roads, but the Boards would only agree on condition that a royalty was paid?—Yes, obstruction was put in the way.

38,225. Why are District Boards hostile to schemes of this sort?—I think they have not been educated to understand the development which will follow tramways.

38,226. Would your Association suggest that local authorities should allow your members to lay light railways by the side of the road without paying any rent or royalty at all?—We would have to pay something. I think villages do not like a tramway close to them.

38,227. Why not?—In nearly all cases you have to go past, and in some cases through, certain villages. I cannot tell you why they dislike it; I suppose it is because it has a disturbing influence.

38,228. *Professor Gangulee*: They like the motor-omnibuses?—Yes, but they can ride on them.

38,229. *The Chairman*: Have you gentlemen thoroughly considered the recommendation to appoint another committee to review the recommendations of the Indian Sugar Committee? It will mean more delay. Would it not be possible to make definite recommendations as to the parts of that Committee's Report which no longer apply?—(*Mr. Shakespear*): We have not at this stage examined the recommendations exhaustively, but what we urge is that in certain well-defined directions, such as the recruitment of a special staff for work on sugar, no delay should be allowed to occur.

38,230. And the placing on a permanent footing of the Sugar Bureau?—Yes.

38,231. If that were done, do you not think the Bureau, in consultation with the trade and with growers, and from its knowledge of the industry as a whole, would be able to judge which of these recommendations (provided money were available) should be given effect to and which should be dropped?—I think so.

38,232. I am only suggesting to you that the appointment of another committee means further delay?—I see that. Delay is the last thing we want.

38,233. *Sir James MacKenna*: You have considerable experience of sugar, Mr. Deerr. Can you make any estimate of the economic loss due to the

present deficient methods of cultivation and manufacture of sugarcane?—(Mr. Noel Deerr): Yes. I estimate the area as 2½ million acres, and the return at present at 10 tons of cane per acre. With the ordinary two-roller bullock mill the out-turn will be 2½ million tons, so that at Rs. 140 a ton the total value will be Rs. 38½ crores. If that quantity of sugarcane were treated in a modern factory, there would be produced a quantity of sugar and molasses which, taking the price of the sugar at Rs. 330 and of the molasses at Rs. 55, would give a total value of Rs. 86 crores, as compared with Rs. 38½ crores. That means there would be a net gain of Rs. 50 crores.

38,234. Have you worked out what acreage would meet Indian local consumption if improved manufacturing processes were introduced?—Yes. I will look that up and let you know later.

38,235. What are the views of your Association about the zone system? You will remember the matter was raised in the Sugar Committee?—(Mr. Shakespear): Yes. Mr. Wynne Sayer submitted a special memorandum dealing with it. Our Association would welcome measures being taken which would ensure to a central factory a certain area of cane cultivated. That system obtains in Java, where certain zones are allotted, and where no factory is allowed to encroach on the zone of another. That was prescribed when they laid the foundations of their sugar industry. The problem to-day in India is very different; rights have been acquired, and although we support the principle, personally I cannot see how it can be translated into a legislative act. I understand it obtains in the United Kingdom with regard to beetroot factories, but there Government has a weapon which we have not got in this country. There is no doubt that the present system is most injurious; the new-comer, instead of paying particular attention to developing the cultivation in his vicinity, if it does not happen to be there when he sets up his factory, thinks it the easiest way is to proceed to pirate somebody else's cultivation. That cultivation does not in a sense belong to the other factory, but the other factory has acquired a right of control by long usage. We have had experience of this procedure; it leads to three or four and, in some cases, I think five different concerns all buying sugarcane at one railway station; that is uneconomical; the cane is hauled long distances and it is naturally not so valuable to the outside factories when they get it as it would be if it were grown near at hand. It also has another bad feature in that it discourages factories from developing and taking measures to encourage cultivation in their own neighbourhood where they realise that this cane can be drawn away by somebody else. The problem is a very complex one; we support the proposal in principle, but I foresee difficulties in putting it into actual practice, and exactly how Government could proceed in such a matter if they thought it advisable to do so I do not think any of us are prepared to say. We would like to see the system introduced if it could be. Of course, it would not be applied in the case of established concerns, only in the case of concerns now starting.

38,236. *Sir Henry Lawrence*: The Government weapon in the United Kingdom is a subsidy, is it?—Yes, I understand so.

38,237. That is what you had in mind?—Yes.

38,238. *Professor Gangulee*: That is only with regard to beet sugar I think?—Yes, that is the only raw material that is grown in the United Kingdom.

38,239. *Sir James MacKenna*: Have you got that figure now?—(Mr. Noel Deerr): Yes, under modern methods of cultivation and manufacture, instead of 2,750,000 acres under cane, all India's need of sugar could be produced by 1,583,333 acres, which would allow 1,166,667 acres to be set free for other crops.

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38,240. Are you satisfied with the existing machinery for the dissemination of the improved varieties of cane?—(*Mr. Shakespeare*): There is not enough machinery, of course, but the system is right. We want many more workers, more trained men and more instructors.

38,241. Is the Association giving any help in the distribution of these varieties?—Our members are.

38,242. From the estates?—The Association as an association is not, but our members are; we are raising seed and distributing it to cultivators.

38,243. Did you see any concentrated increase of particular varieties in particular localities?—In Bihar, yes. I do not know how many acres there are under the new canes. (*Mr. Noel Deerr*): Last year there were 3,052 acres in Bihar under Coimbatore canes. That is only the canes which came to Begg Sutherland's factories.

38,244. *Professor Gangulee*: That is only in Bihar?—Yes.

38,245. Can you tell us with regard to the United Provinces?—We have no figures for the United Provinces.

38,246. *Sir James MacKenna*: But I understand there is a very big produce from Shahjahanpur; would you deal with that cane in any of your factories?—(*Mr. Shakespeare*): We do not think there is a large distribution of Coimbatore cane from Shahjahanpur. I believe there is of other cane, which we do not cultivate.

38,247. What factories deal with those canes? Does Rosa?—Yes, Rosa does.

38,248. What steps have the Association been taking to improve manufacturing operations?—I think all our members are taking steps to raise the efficiency of their factories.

38,249. Has the improvement in manufacturing processes been very marked in recent years?—Yes, very marked in the last three years.

38,250. Under the stimulus of high prices, or what?—No, we knew the high prices were not going to last, so we set about putting our house in order.

38,251. Can you give us any definite figures of the yield of these Coimbatore canes which you grow on your own estates, showing their superiority over the *deshi* varieties?—(*Mr. Noel Deerr*): Yes, in the factories operated by Messrs. Begg, Sutherland & Company the returns in tons per acre (that is short tons of 2,000 lbs.) were, of the Coimbatore varieties in the season 1925-26 an average of 22.9 tons per acre as compared with 9.8 tons per acre of the local variety. Over the whole of the acreage returns collected by Begg, Sutherland & Company, that is to say, the canes we buy, the average of the Coimbatore varieties was 15.5 tons per acre as compared with 7.6 tons of the local varieties. We do not get the figures for the other concerns which are not in our group.

38,252. For the more rapid development of the sugar industry as a whole and of cane growing in particular, are you in favour of the co-ordination of work between the Imperial Department and the Provincial Departments, or have you any ideas as to how such co-ordination could be effected. I think you said in Bihar you look to Pusa more than to the Provincial Government?—(*Mr. Shakespeare*): Co-ordination must follow, but in the initial stages we should not like to see research work provincialised; we think research and attention to disease and insect pests should be centralised with the Government of India. Once the canes have been established, proved and distributed for general cultivation, then I think it is the duty of the Provincial Governments to step in and carry out the rest of the work, the popularisation of the new types and so on.

38,253. Of course, in this Province you have a concrete instance where very well-known work is being done on sugarcane provincially?—Yes, I know Mr. Clarke's work, but there you have got an enthusiastic officer; in all cases you may not have enthusiastic officers and you may have cleavage of opinion between a provincial Director and the central organisation over some matter which is highly technical.

38,254. In answer to the Chairman you have already expressed the view that the Imperial Department should be strengthened, and you have indicated the particular directions in which that should be done?—That is what we want done at once.

38,255. Do you think the initiation, formulation and carrying on of schemes should be done by the central authority?—As regards policy, yes.

38,256. In answer to the Chairman, I think, you said that you were now inclined to regard the creation of an Indian Sugar Board as perhaps not so desirable as it was when the Sugar Committee reported. I notice from your memorandum* that it might be said that the Association is in agreement with the ultimate ideal of the creation of an Indian Sugar Board and of a Central Research Institute?—I was in England when this was drafted, and I did not see it; but perhaps I may say that is my personal opinion; I had better not involve the Association in that.

38,257. That will be gone into in accordance with the Chairman's suggestion when the Report of the Sugar Committee is reviewed and they give a considered opinion?—Yes.

38,258. *Professor Gangulee*: How does the standard of efficiency in manufacturing attained in your factories here compare with that of sugar factories in Java?—(*Mr. Noel Deerr*): At the present moment, of the factories operated by Begg, Sutherland & Company, four of our factories are equal to the Java average, two are a little below, and one of them is distinctly above the Java average at the present moment. Our factories as a whole are very little if anything below the Java average.

38,259. Your Association recommends the opening of sub-stations in the Provinces for testing canes; what are your reasons for that recommendation?—(*Mr. Shakespear*): We believe this part of the work should all be done under one central organisation; a cane which has been proved to be suitable in one district, say Bihar, may not be suitable in the United Provinces, and the testing of different varieties introduced in Coimbatore would have to be done in different areas with a view to seeing whether they were suitable for those areas.

38,260. There are many experimental farms in the Provinces, and those farms could be utilised, perhaps, instead of having new sub-stations?—I believe the experimental farms already in existence could be utilised for that purpose.

38,261. You also say you would like to have a centralised sugar school. Where would you like to have that school?—(*Mr. Noel Deerr*): It would be for the training of Indians in the cultivation of sugar cane and scientific manufacture of sugar. At present, to get that training they have either to go to Hawaii or Trinidad or Louisiana.

38,262. Where would you locate such a school in India? Would you have it at Pusa?—Not necessarily in Pusa. I would not like to give any opinion as to where the school should be located. Pusa would be a good place, because there is already an organisation there; if possible, it should be within reach of factories.

38,263. That would, perhaps, be more convenient?—Yes.

* Not printed. A preliminary memorandum.

38,264. I see that in your note you refer to a number of research problems, especially with regard to plant diseases and pests. I think you express the opinion that such research should be conducted in the central station instead of in the Provinces; is that your considered opinion?—(*Mr. Shakespear*): Yes, we would like to see that work centralised, at any rate at present.

38,265. Have you any idea how that central organisation should correlate their activities with those of the Provinces in matters of research of this nature?—We based our opinion on what has proved to be so successful in Java, that is to say, that all research work is conducted under the orders anyway of the central organisation, and then the information is made available to everybody connected with the industry; but I do not think that separate efforts are allowed to be carried on by independent officers; the work is all co-ordinated and the policy laid down; that has been so successful and their industry is such a wonderfully organised industry that we think India cannot do better than follow what Java has done.

38,266. Of course, the local conditions have to be taken into consideration in research work?—Yes.

38,267. I see your view is that demonstrations on land leased for short periods from the cultivators are more successful than those conducted on Government farms. Is that based upon your experience?—Yes. Take a field near the village and, if possible, grow the crop yourself and let the cultivator see the difference between his crop and your crop; that is the best demonstration. He will get great practical experience out of that. The man sees what you do and that you are not doing anything to deceive him, that you are not putting more manure than he could afford to do, but you are not ploughing deeper than he does, and so on.

38,268. Once he is convinced, you do not find extra-conservatism in him to take up any new methods?—No. If you prove to him the value of the methods you employ he will be willing to follow.

38,269. What are the chief fertilisers which you use in your farm?—Mostly farmyard manures; also oil cake and sulphate of ammonia; we are also trying super-phosphates, nitrate of soda and cyanamide.

38,270. There is a great deal of scope for sulphate of ammonia as being a suitable fertiliser?—Yes, for the canes.

38,271. Under irrigation or without irrigation?—It should be applied just before the breaking of the monsoon.

38,272. *Mr. Calvert*: On page 497 of the note it is stated that the Association advocates the extension of the co-operative banking system and the enlargement of the existing powers of such banks. Is there any special suggestion there?—We are very much in favour of the extension of the system. I am not quite sure what is meant by the enlargement of the powers. I should think that is a mistake.

38,273. With reference to the Usurious Loans Act, would you care to make any suggestion as to why this Act is not being used?—I do not know why it is not employed; I think it could be employed with great value.

38,274. With regard to the question of marketing, page 498, you raise the question of co-operative marketing of *gur*?—I think that could be brought about.

38,275. The difficulty is of course that the *gur* dealers are better organised than the growers?—Yes.

38,276. Can you suggest any means of getting out of the difficulty?—It is a case of education, trying to educate the village to work as a whole instead of individual people who are in the hands of these dealers.

38,277. Can you do that if the dealers would not buy *gur* from a co-operative society?—We are doing direct purchase now as far as we can, and we hope that by the establishment of a bank we might be able to induce the villagers to sell co-operatively.

38,278. But the difficulty is to get the people to buy?—Yes; and if a village takes independent action and markets its goods everybody boycotts it.

38,279. Can you suggest a way out?—It is a very complex and difficult subject.

38,280. On this question of transport by tramway, the tramway to carry cane would of course prove cheaper in the end if it were allowed also to carry on transport for the public?—Yes.

38,281. But you are up against the Railway Act and the sanction of the Railway Board is necessary?—Yes.

38,282. Have you any suggestions to make with regard to that?—No. Such undertakings would be too costly unless one had a tramway for a considerable distance. Our tramways are about eight or nine miles. We would like to carry other goods in seasons of the year when the line is standing idle. But I do not know whether there is any chance of a relaxation of the Act as regards that.

38,283. It would be of great use to you?—Yes, if we are allowed to carry other goods than our own at seasons of the year when the rolling stock is not fully employed.

38,284. *Sir Henry Lawrence*: Are you acquainted with the statistics of the acreage of cane for a period of years in India? Have you studied whether there has been any increase in the total area or production of cane during the last twenty years?—I believe there has been some increase in recent years in area; of course the yield depends very much on the season.

38,285. Taking the average, do you consider that there is more sugar cane grown and more outturn now than twenty years ago?—Yes, I think so; but I have not got the statistics before me.

38,286. The graph I have before me indicates that the area twenty years ago under cane was an average of 23,00,000 acres; in the following five years, 24,00,000; in the next five years, 26,00,000 and in the last five years, 25,00,000. Do you accept those figures as correct?—I suppose they are correct.

38,287. So that in twenty years there has been an increase of not more than 8 per cent.?—Yes.

38,288. That will indicate that, although irrigation has increased very largely in these twenty years, the area under cane has not increased appreciably. I make that point with reference to your suggestion that the cane cultivator is greatly interested in the present import tariff?—Quite.

38,289. If that tariff were removed, the cane cultivator would probably suffer; is that your opinion?—Yes.

38,290. Your industry represents only some 3 per cent. of the total outturn of sugar in the country?—Yes; it is very small at present.

38,291. There is a recommendation in the Taxation Enquiry Committee Report that the tariff should be removed. You think that would be injurious to the cane cultivator?—Yes, it would undoubtedly affect cultivation.

38,292. Can you tell us to what extent white sugar is at present made by the cultivator in small mills of his own? Is there any such white sugar made?—Yes, a certain amount of hand-made sugar; but I think the taste for them is passing away.

38,293. That is found chiefly in this Province, is it?—I think it is also found in Bombay to some extent.

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- 38,294. Is that being killed by the Java importations?—Yes.
- 38,295. What is the present proportion of the Java importations to the factory-made white sugar?—About 10 to one.
- 38,296. So that the inference would be that the small hand-made concerns are being destroyed by the importation of Java sugar; is that your view?—Yes; perhaps it may be also that the people's taste is changing; new tastes are arising. The hand-made sugar has got a special flavour.
- 38,297. An attractive flavour or a repulsive flavour?—It has got a peculiar flavour.
- 38,298. Can you tell us anything about the conditions in which the Java factories work? How do they obtain land? Is that controlled by Government in any way?—There is a minimum prescribed rent which they must pay to the communal societies from which the factories lease, but otherwise they can arrange their own terms. The land is taken over for a certain period, and it is handed back to the villages and then other land is taken in exchange. I think in the old days the Government interfered, but I do not think there is any interference now from the Government except that a minimum rent is laid down.
- 38,299. *Sir Ganga Ram*: Is sugar machinery imported into India on the same terms as agricultural machinery? What I am told is that sugar machinery gets no favourable rates as agricultural machinery does? Is that the case?—It does not get the benefits which are accorded to agricultural machinery.
- 38,300. Not even in railway freights?—None whatever.
- 38,301. Has your association never considered that point with a view to reduce the cost of erecting sugar factories?—We have never taken up that point. We sometimes by special treaty obtain a special rate from a railway company for the carriage of the whole of a factory plant, but as a general rule we have not taken up that question.
- 38,302. You said that out of the tariff which is made by the Government something might be given to the Association? Would you go still further and recommend some bounty to the sugar factories?—No, but we would ask it to be devoted to the work of improving the industry, not that it should be given to us.
- 38,303. But would you support the idea of a bounty being given to the people who erect sugar factories?—No.
- 38,304. Why not?—I do not think that we deserve any bounty, but we would no doubt be very glad to receive it if it is given to us.
- 38,305. But that is not a new thing; it is followed in other countries?—Yes, I know that; but often bounties are very mischievous things.
- 38,306. Who does not your Association take up the idea with a view to promoting its industry?—We would be very glad to accept a bounty if it was offered but I do not think we could make out a case for a claim.
- 38,307. Again would you support the idea of giving a rebate to people who grow cane and sold it to the factory owners?—As against converting it into raw sugar.
- 38,308. Yes?—I do not think Government could differentiate.
- 38,309. All I want to know is whether you support that idea?—Yes.
- 38,310. You said that in Bihar the fertility of the land on which cane is grown is decreasing; is that so?—That is the opinion of some of the planters in those parts.
- 38,311. Do they grow cane every year, or do they follow a rotation system?—They generally follow a system of crop rotation. In cases they first grow

cane, and then fallow; then again cane, after that a green manure crop; and then again cane, or alternatively there is cane and some leguminous crops intervening for two seasons and then cane again.

38,312. What is the percentage of the total gross area which has been put under cane in Bihar?—No district in Bihar is so heavily cropped as the districts of Gorakhpur and Meerut in the United Provinces, in the former of which I believe 7 per cent. of the cultivable area is under cane.

38,313. *Sir Thomas Middleton*: With reference to the duties on sugar machinery, is it not the case that mills which are to be worked by manual or animal power can be imported free?—Yes, that is the case with the small mill.

38,314. On page 496 of your memorandum you express the opinion that more institutions and instructors are needed. What type of institution had you in mind there? Were you referring to farm schools?—Yes.

38,315. I infer from a perusal of your memorandum that you agree that itinerant instructors are what you chiefly want at the present time?—Yes, instructors in connection with cultivation methods, or fieldmen I would call them.

38,316. You point out that a centralised sugar school is required for sugar technology. Would any factory be required in connection with that school?—We would want a small demonstration plant.

38,317. Semi-commercial plant?—There is a scheme for such a school at Cawnpore.

38,318. Have you any estimate of the cost of such a school?—I think Dr. Watson's budget was about Rs.1,00,000.

38,319. Have you any idea as to how many men could be absorbed by your industry if they were trained in that school?—We gave Dr. Watson some figures, and I think we said that we could take some six students a year till we got to the absorption point.

38,320. When would you get to the absorption point?—We would expect to get to the absorption point in the case of our established factories in about four years.

38,321. I am thinking of the number of students for which there would be an effective demand in the country. There is no use setting up a school if there is no demand for pupils?—There is a demand undoubtedly.

38,322. And that is about six a year?—For our own group of course we would take six a year, until we filled our factories.

38,323. Let us hear what you would do?—Our idea would be to place them in the first instance in charge of stations in the factory, such as mill houses, etc., and there would always be a chance of their promotion to supervisors. I should think that about 25 would be the number which could be taken on in four years.

38,324. *Professor Gangulee*: How long would you train them in the school?—They would go through a four years' course, the degree of B.Sc. being the qualification required.

38,325. What salary would they draw after coming out of the school?—About Rs.150 to start with and they would be placed in charge of stations.

38,326. *Sir Thomas Middleton*: When you said that you could see a demand for 25 for your group of factories, did you mean all the factories represented on your Association?—No, I am talking of our own group. But you could almost double it for the whole Association, that is, you could make it 50.

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38,327. On page 497 of your memorandum you suggest the introduction of legislation limiting the right to mortgage immovable property, except to recognised banks and credit institutions. What is a recognised bank or credit institution?—We mean the co-operative banks, but it may include a private bank provided it satisfied the conditions.

38,328. Would that not be very likely to limit the facilities of a cultivator for getting his working capital?—It is no use trying to knock down one system until you have got another system to take its place. We would like to see an extension of the co-operative bank system because we know from our own experience how great its value is.

38,329. Would you like to see legislation to restrict the term of mortgage to say twenty years, capital being repaid by sinking fund?—Yes, I think that would be a suitable compromise.

38,330. Have any of the factories which you represent made use of the Adco process in connection with their farming operations?—No, but we are taking it up now. I am already in correspondence with the Adco people and I expect in a very short time to have it under control.

38,331. You have been making a good many experiments in manures in your group of factories?—(*Mr. Noel Deerr*): Yes, we have been doing it for three years now and at the end of this third year we hope to get some definite results. We have got three large series of experiments on fertilizers under operation this year and at the present moment the results are being harvested.

38,332. Would you let us have the results when they are completed?—Yes.

38,333. You advocate a system of plant quarantine and control. What are the existing arrangements? Are they not satisfactory?—(*Mr. Noel Deerr*): I am not sure that there is any extensive system of plant quarantine in India, but I do know that there is a quarantine against the importation of cane into India to this extent that all the cane imported into India has to be imported through the Sugar Bureau. Owing, however, to the possible danger of the introduction of harmful insects and plant diseases I should like to see the system of quarantine which now exists very rigidly enforced, in fact more rigidly enforced than is the case at the present moment.

38,334. You have not yourself actually come across any cases in which the quarantine has proved to be insufficient?—(*Mr. Noel Deerr*): No.

38,335. You suggest the strengthening of the Pusa Institute for dealing with the cane problem centrally, but there are many cane problems that must be dealt with locally. Take for instance the testing of those canes which are bred in Coimbatore?—Certainly, but under the direction of Pusa or through a Central Board which would dictate the policy.

38,336. The testing of a local cane is a business for the local man, but he would be directed by Pusa to make the test and to report on the quality?—Yes, the central authority would dictate the policy to be followed.

38,337. Similarly with insect pests and with the fungus pests on cane? These subjects must be studied locally? Your idea is that there should be one policy, directed from Pusa?—Yes.

38,338. What does your Association itself spend on research? Do you employ chemists?—(*Mr. Shakespear*): The Association does not employ any staff at all.

38,339. The individual concerns employ chemists?—Yes.

38,340. The Association as a body does nothing of that sort?—No.

38,341. Has your attention been directed to the development of Industrial Research Associations in Britain? Industries have come together, put up

schemes to the Department of Scientific and Industrial Research and got grants-in-aid for work to be done under officers appointed by the industry?—I know of the movement, but I have not examined its working.

38,342. Nor have you thought of any such scheme in connection with your sugar problems in India?—No.

38,343. Are there not problems in sugar technology which arise quite independently of the growers' problem?—Yes, manufacturing problems.

38,344. Each of you is dealing with these problems independently at the present time?—Yes. There is no co-ordination such as they have in Java.

38,345. Or such as they now have in Britain?—None whatever.

38,346. Reference was made to zones for factories. Could you give a rough indication of the size of zone which would be suitable under the conditions of Bihar or the United Provinces?—About a 10-mile radius for a factory of moderate size.

38,347. What do you regard as being the ideal size for a factory to suit Indian conditions?—The biggest we have is for 15,000 maunds a day of cane crushed.

38,348. What would be the smallest size which could be successful?—6,000 maunds a day is the smallest we have.

38,349. Do many of your factories grow a large proportion of the cane which they work?—No. We only grow a small proportion.

38,350. What would be the largest proportion grown by any group of factories?—In one case 30 per cent. It will be 40 per cent. next year.

38,351. That is exceptional?—Yes. In our case it is about 10 per cent.

38,352. The general rule is to purchase cane from cultivators?—Or from planters.

38,353. Under contract?—Yes.

38,354. *Sir Ganga Ram*: You know the figures for refined sugar made in this country. Can you tell us how much of that is made direct from *gur* and how much from cane? Are those figures available?—Yes, and I will obtain them and send them to you.*

(The witnesses withdrew.)

APPENDIX I.

STATEMENT A.

The Association has obtained the following information by the courtesy of the Secretary, Sugar Bureau, Pusa:—

Production by Sugar Refineries in India.	1924-25.	1925-26.
	Maunds.	Maunds.
Gur melted	1,798,406	1,545,698
Sugar made	888,859	802,413
Molasses obtained	698,359	580,216

* *Vide* Appendix I.

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STATEMENT B.

Production of sugar by the sugar factories in India.

Years.	Sugar direct from cane.	Sugar refined from gur.
	Maunds.	Maunds.
1919-20	628,920	1,211,274
1920-21	669,291	1,324,646
1921-22	753,638	1,303,433
1922-23	651,415	1,368,126
1923-24	1,044,856	1,538,304
1924-25	921,950	888,859

Reference may also be made to page 405 of Part V, Vol. XXI, of the *Indian Agricultural Journal*, September, 1926, where, in an article by Mr. Kasanji D. Naik, of the Sugar Bureau, Pusa, figures of sugar production from gur in (1) the United Provinces, (2), the Madras Presidency and the Punjab, and (3) the whole of India, respectively, during 1923-24 and 1924-25, are given, as also some interesting figures of the cost of refining gur and Java sugar respectively. References are also given to the quantity of sugar produced by factories making sugar direct from cane.

APPENDIX II.

Observations on the Report of the Indian Sugar Committee by the Indian Sugar Producers' Association, Cawnpore.*

In general, the Association accepts the recommendations of the Indian Sugar Committee, though in certain points, we think, their conclusions are deserving of modification in the light of present conditions.

As regards local administration problems, the Association does not express any opinion.

2. The Association is at one with the recommendations regarding the necessity for research and is of opinion that research for the benefit of the sugar industry in India should be under the control of one centralised body. The testing of the results of research and their presentation to the public may suitably be deputed to localised authority, the policy to be followed in testing to be dictated by the centralised body.

3. The Association advocates the establishment at as early a date as possible of a Sugar Board, the constitution of this Board to consist of:—

The Agricultural Adviser to the Government of India.

The Director of Commercial Intelligence.

Three Provincial Directors of Agriculture (or officers deputed by them); the various provinces to be represented in rotation.

One representative of the manufacturing industry.

One representative of the larger cane growers.

One member to represent the interests of the small cane grower and manufacturer of raw sugar.

One member to represent trade interests.

The members to be appointed for three years, with opportunity of re-appointment.

The Association desire to emphasise the importance of the very early constitution of the Board.

* These observations are the views of the majority of the members of the Indian Sugar Producers' Association.

4. The Association is of opinion that research for the benefit of the sugar industry may conveniently be merged into the Institute at Pusa and become a part thereof. Exception should be made, however, with regard to cane breeding, which, the Association thinks, may best remain located at Coimbatore.

5. The Association is of opinion that the lines of research to be followed up should embrace:—

(a) The study of soils and of their fertiliser requirements and of the appropriate rotations to be followed. This study should include fertiliser plot experiments in the different cane-growing areas.

(b) The study of irrigation as applied to cane and the best means to render available to the small cultivator sources of water such as that from wells, small rivers, lakes and tanks.

(c) The study of the engineering and manufacturing problems as they concern the small producer of *gur*. This department would study the best design of mills, of furnaces, pans, etc., in the interest of the small producer. It would also attack the problem of community central factories for a village or group of villages.

(d) The study from the economic view point of the various insect pests which attack sugar cane and the formulation of means effectively to control these pests.

(e) The study of the various fungus diseases of the sugar cane and of prophylactic methods to be employed in their control.

(f) The continuation and extension of the cane-breeding work at Coimbatore, attention being paid towards breeding cane suited for different types of soil, rainfall, climatic conditions, of different periods of maturity and of resistance to fungus diseases. The testing of canes so bred would be deputed to the various provincial agricultural departments for testing and distribution when found suitable.

6. The Association considers that the Sugar Bureau should be made a permanent institution, to be carried on under the direction of the Pusa Institute.

7. The Association is of opinion that whole-time officers should be delegated to the work of sugar research, and that the personnel should consist of:—

A Sugar Engineer with knowledge of manufacturing processes,
An Economic Entomologist,
And a Mycologist,

with the appropriate subordinate staff.

If accommodation and equipment are not immediately available at Pusa, the Association would urge the necessity of a grant to enable this work to be initiated without delay.

8. The Association suggests that the funds for creating and carrying on this work be obtained by appropriating some small portion of the revenue now raised from the sugar import duty.

9. The Sugar Board should be provided with executive powers, and the utilisation of the special funds allotted for the programme should be entrusted to the Board. From the money so obtained grants might be made to Provincial Governments to carry on testing and experimental work under the direction of the Sugar Board, either at sub-stations to be established at selected sites in each province, or at the existing provincial stations, and particularly the Farm at Karnal might be so utilised.

10. The Association does not think that the recommendation of the Sugar Committee to establish a Government pioneer factory for Upper India is advisable. This has already been done by private enterprise, and there are already operating in Upper India factories, which, on any standard of

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equipment and efficiency, would be considered creditable in any part of the world. These factories would be available in case the Sugar Board wished to demonstrate some new process or the results of any particular research. The Association also does not consider necessary the demonstration sugar factory included in the Committee's working scheme, but they would like the project for a sugar class in connection with the Technological Institute at Cawnpore to be proceeded with. They also think it advisable that a similar technological course be instituted in Madras.

11. In connection with the research scheme, the Association advocates the granting of a certain number of studentships to approved candidates who hold the B.Sc. degree, for training in the technique of cane cultivation and in the study of cane diseases and pests who would carry out their course at Pusa. The Association thinks factory owners would be prepared to give students undergoing a sugar course at the Technological Institute, Cawnpore, or similar institutions in other parts of India, a season's training in practical sugar technology, but to enable this to be carried out it will be necessary for the Sugar Board to allot funds to provide for suitable accommodation at the factories selected for this purpose.

12. The Association is also of opinion that a periodical devoted to technical information regarding sugar cane cultivation and sugar manufacture would be of value. If this were initiated the articles of this phase of agriculture now appearing in the *Agricultural Journal of India* would appear in this suggested Journal.

APPENDIX III.

Economic loss to India following on present methods of manufacture and cultivation.

The acreage under sugarcane in India is about 2,750,000 acres from which at 10 tons canes per acre, there is produced 27,500,000 tons cane.

With the two-roller bullock mill, a yield of 10 per cent. *gur* on cane is a general average outturn indicating the production of 2,750,000 tons *gur* per annum.

Taking the value of *gur* as Rs.140 per ton (Rs.5 per maund), the value of this production is Rs.38,50,00,000 (38½ crores of rupees).

The 27,50,00,000 tons of cane treated in a modern efficient factory would give, at least, 2,475,000 tons direct consumption sugar and 9,02,500 tons molasses.

Taking the selling price of sugar at Rs.330 per ton (roughly Rs.12 per maund), the value of the sugar is Rs.81,67,50,000.

If molasses is valued at Rs.55 per ton (roughly Rs.2 per maund) the value of the molasses is Rs.4,96,38,000.

The total of these is Rs.86,63,88,000 whence has to be deducted the value of the *gur*, or Rs.38,50,00,000, leaving a difference of Rs.48,13,88,000, or roughly 50 crores, and this represents the economic loss to India following on present methods of cultivation and manufacture.

If it is also considered that by the introduction of new varieties of cane and by improved agricultural methods, the yield of cane per acre could be doubled, the economic loss will amount to approximately double that quoted above and will be of the order 100 crores.

This statement does not consider, in any way, the capital cost of factories to manufacture the sugar which could be produced from this quantity of cane. To treat the whole 27,500,000 tons cane would require 300 factories of a capacity 800-1,000 tons cane per day and the capital cost of these erected and ready to work would be about £50,000,000 sterling.

APPENDIX IV.

Improvement in manufacturing conditions.

This is shown in the following statement comprising the results of one group of factories (in percentages):—

Year.	A Yield cane.	B Yield cane.	C Yield cane.	D Yield cane.	E Yield cane.	F Yield cane.
1907-08	6.0	—	—	6.3	—	—
1908-09	7.0	—	—	5.7	—	—
1909-10	6.4	—	—	6.0	—	—
1910-11	7.0	—	5.6	5.0	—	—
1911-12	6.6	—	6.3	6.0	—	—
1912-13	7.5	—	7.9	6.7	—	—
1913-14	7.0	—	7.0	6.6	—	—
1914-15	7.6	—	7.5	6.1	7.2	—
1915-16	7.1	—	6.6	5.1	7.2	—
1916-17	6.9	—	7.4	5.7	7.9	—
1917-18	7.1	—	7.6	5.5	8.1	—
1918-19	7.4	—	8.0	6.2	8.5	—
1919-20	7.2	5.7	7.8	6.0	7.7	—
1920-21	7.8	6.9	8.6	5.7	7.9	5.6
1921-22	8.0	7.1	9.6	6.2	7.5	7.3
1922-23	8.4	6.8	9.5	7.1	8.0	7.6
1923-24	8.2	6.2	9.1	7.5	8.4	9.2
1924-25	8.6	7.5	9.7	7.9	8.4	9.0
1925-26	8.4	8.3	9.5	8.6	7.9	9.2
1926-27 (Estimate)	10.2	8.5	10.3	8.6	9.0	9.3

Of the factories in this group, two are now operating at an efficiency which would be considered superior in Java, two are quite equal to good Java practice and two are a little below.

APPENDIX V.

Zone system as applied to sugarcane cultivation and manufacture.

The agricultural economics of sugarcane cultivation differ from those of most other cultures in that there is produced a highly perishable commodity which has to be worked up without delay by means of expensive and complicated machinery.

By the zone system is meant the allocation of certain well-defined areas to a central factory, that factory alone having the right to purchase cane and to manufacture sugar in that area. Under this system, each factory would receive, in a sense, a licence from Government for this purpose.

At the present moment, in the district of Saran and in the immediately contiguous parts of the United Provinces, there are ten central factories, all competing for cane in this area, and at some stations, as many as six weighbridges are in operation. Some of these weighbridges are located over 100 miles from the factory and serious economic loss obtains, not only following on the payment of unnecessary freight, but also from pilferage and deterioration of cane *en route* which is particularly severe during the latter part of the cane season.

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In one particular instance, a pioneer firm has built up a substantial business and more than any other has established a stable industry, not only to their own benefit, but also to the material advantage of the small holders within a radius of twelve miles from the factory. At the present moment, recently constructed factories are purchasing cane within a few miles of the pioneer factory and are transporting it, in some cases, as far as 100 miles. Although the grower is a free agent and under no contract to the pioneer factory, the latter cannot fail to feel some resentment and to regard its new competitors as interlopers. An objection which could be raised against the zone system is the lack of competition which would result and which might place the small grower under the control of a central factory, this latter taking advantage of its position to force down the price of cane to the detriment of the grower. A policy so short-sighted would soon result in the refusal of the grower to supply cane, and it is recognised that the establishment of a cane sugar industry depends on the mutual co-operation of the factory and grower, both sharing in any advance of prices and suffering equally when prices fall. In a complete zone system the price paid for cane might be formally fixed by agreement on a sliding scale dependent on the price of sugar.

A zone system would also protect that factory which develops cane cultivation in its vicinity. A factory is unlikely to help the cultivator if it is exposed to having the results of its labour appropriated by a rival factory which has done nothing towards development.

SYED TOFAIL AHMED, Retired Sub-Registrar, Aligarh.

Replies to the Questionnaire.

QUESTION 2.—AGRICULTURAL EDUCATION.—About 92 per cent. of the population of India being illiterate, no improvement in agriculture or any other industry is possible. There being very little difference of intelligence between the tenants and the oxen they use in their ploughs, it is useless to expect that they would understand and appreciate the new methods of agriculture without which there can be no improvement at all. I wish the members of the Royal Commission would devote their foremost attention to the most important question of increasing literacy among the peasants. I have read in papers that in seven years the percentage of literate persons in Russia has been raised from 7 to 93 per cent.; I suggest a ten-year programme be made for future work, according to which literacy may be increased in this country to as great an extent as possible.

The next question is that of the subjects to be taught to the rural population, and it is evident that there should be no education of peasant boys without the subject of agriculture in their course.

In this connection, I may say that the greatest requisite is the supply of sufficient funds for the purpose, which may kindly be recommended by the members of the Royal Commission.

I lay some literacy figures of the United Provinces, before the Commission, which would show that the rate of our progress in literacy is exceedingly slow.

In the Census of 1891, our literary figure was 3·2 per cent., and the Census Commissioner of that time made the following remarks about our Province:—

“ N.W.P. (as it was called in those days) enjoys the distinction of being the most illiterate of the great Provinces of India. It is surpassed in this respect only by the backward Province of C.P.”

Now I will try to show if there has been any progress in literacy since 1891:

In 1891	the literacy	was	3·2	per cent.
„ 1901	„	„	3·1	„
„ 1911	„	„	3·4	„
„ 1921	„	„	3·7	„

This shows that from 1901 we raised our literacy at the rate of .3 per cent. per decade or 1 per cent. in 33 years. And if we go on at this rate we will reach the literacy of the Indian State of Mysore (7·4 per cent.) in 122 years; that of Baroda (12·8 per cent.) in 297 years, and if the figures of Russia given in the papers be correct (94 per cent.) we expect to reach that literacy in a long period of 3,000 years.

By this I only mean to say that if the progress in literacy is not accelerated, no improvement in agriculture is possible.

QUESTION 6.—AGRICULTURAL INDEBTEDNESS.—Borrowing is a necessity of all business. It is not an evil, provided it is done for productive works and money is obtained on moderate interest. In this country the rate of interest is heavy, hence it is difficult for cultivators to pay even the interest due, leaving aside the principal. Under the circumstances, cultivators have to borrow not only for improving their productive works but also for their daily requirements of food not to speak of clothing, as they have to remain half naked all the year round.

Hence the greatest need of the cultivator is that they be supplied with money at low rates of interest. That can only be done by Government. The Government may raise loans from the people in large amounts and may start not only co-operative banks, but banks of all sorts, agricultural banks, savings banks in villages, so that the villagers may know to save and to deposit money, may easily get money for productive works at all times and

thus money may be in circulation. This is the only means by which rate of interest can be lowered.

Co-operative banks are the chief remedy of the evil of indebtedness, but their progress is slow. So I have proposed above that the Government may raise loans and start their own banks in rural areas. The Imperial Bank and some other banks advance money for business purposes in some commercial towns. The same sort of banks, started and worked by the Government, may, in the above named manner, advance money to cultivators for agricultural purposes and receive deposits so that villagers may learn economy and begin to take interest in saving money. It is often complained that Indians are addicted to hoarding money and keeping it under the ground and converting coins into golden jewellery. But the fact is that they are not taught to invest and villagers are not given facilities for depositing their money in saving banks. At present if they happen to earn money the only uses they know of it are: (1) spending away on personal comforts, (2) hoarding, and (3) spending it away in marriages and feasts.

QUESTION 14.—**IMPLEMENTS.**—(a) I am very much in favour of the introduction of new implements, without which there can be no improvement in Indian agriculture.

(b) and (c) The poor cultivator has no means to purchase costly implements. So I propose that arrangements may be made to give the implements on hire-purchase system like Singer's sewing machines or on simple hire like sugarcane crushing machines, which are very successful in India. Without adopting such measures, it would take very very long to introduce new implements and machinery in this poor country.

QUESTION 15.—**VETERINARY.**—(c) (i) The veterinary dispensaries are in the headquarters only and thus are out of the reach of villagers. The veterinary doctors go about in villages without medicines and thus can be of little use to villagers.

(ii) I do not think there are touring dispensaries in United Provinces for veterinary diseases. The doctors for men are supplied with a stock of medicines and tents, which they pitch in some central village and stay there for some days and attract patients in this way, whereas veterinary doctors go about the villages without any medicines or tents and can do very little good.

QUESTION 24.—**ATTRACTING CAPITAL.**—People generally do not know that agriculture with new implements is the best investment in the country. I am impressing this point in my monthly paper called *Goodman*, and I think propaganda should be made by Government to the same effect on a large scale.

QUESTION 25.—**WELFARE OF RURAL POPULATION.**—For the promotion of the general well-being of the rural population, it is necessary to have very good roads and other means of transport. At present there are very few *pucca* and *katcha* roads, and the latter are in the worst condition. I am doubtful if the money allotted for their annual repairs is fully spent or not. I suggest some inspecting agency be appointed to see if they are properly repaired. At present *katcha* roads are sometimes lower than the adjoining fields on both sides and serve as drains in the rainy season and in some cases to travel on them by boat is easier than by cart.

Oral Evidence.

38,355. *The Chairman:* Mr. Tofail Ahmed, you have been good enough to provide us with a note of the evidence you wish to put before the Royal Commission. Have you anything you would like to add at this stage?—There are some further suggestions I would like to make.

38,356. We are prepared to hear them now, or you might prefer to embody them in a supplementary note which we would add to your evidence?—I would prefer to do that.

38,357. That is probably the best way. What are your own occupation and interests?—I am a Government pensioner, having been in Government service 32 years. I was a Sub-Registrar in the Registration Department.

38,358. I think you now conduct a newspaper?—Yes, with the object of persuading people to invest their money in productive works, and especially of persuading Mohammedans to take up commercial interests.

38,359. Trying to stimulate interest in industrial investments?—Industrial, commercial and agricultural investments.

38,360. Are you proprietor or editor of this paper?—Both. It is only a monthly magazine.

38,361. What authority have you for the statement that in seven years the percentage of literate persons in Russia has been raised from 7 to 93?—That statement was made by Mr. Saklatvala in the House of Commons and was not contradicted there.

38,362. In your memorandum you emphasise the importance of a supply of sufficient funds for the purpose of education. You suggest that this Commission might recommend the granting of funds. From what source do you suggest those funds should come?—I do not think that is important, because whatever taxation Government imposes has to be paid. We pay taxes of all sorts every day.

38,363. I want to be clear that you agree with me that there are no sources from which funds can come except new taxation or an alteration in the allotment of existing revenues as between various subjects?—Yes.

38,364. You know, of course, that Government has not got a large heap of money of its own to give away?—Yes, but it can raise money by taxation or by curtailments in other directions.

38,365. In the interests of accuracy I should like you to look at the statement on page 518, which says: "if the progress in literacy is not accelerated, no improvement in agriculture is possible." It is, I suppose, a fact that various contributions to agricultural progress have been made quite apart from educational improvement?—Yes.

38,366. So that that statement is not quite accurate?—In my opinion, progress in agriculture or industry depends on decreasing the cost of production so as to be able to compete with foreign countries. By increasing literacy we shall get good and efficient workmen who will be able to do more and better work than illiterate men. That will help to reduce the cost of production. The second point is working capital, and the third research. I lay great stress on increasing literacy and providing capital at lower rates of interest.

38,367. What is your experience of the co-operative movement?—I have no personal experience. I have read about it, and consider it a very good idea. It has been very successful in the Punjab.

38,368. Have you any experience as a practical farmer?—My cousins are farmers, and I have seen their work. I myself am a landowner.

38,369. Do you farm your own land?—No; I have been in Government service and could not do so. My cousins do it.

38,370. *Sir Henry Lawrence*: Do you expect there will be any decrease of revenue from the Excise Department in future?—I do not think so.

38,371. You are not in favour of prohibition?—We may make laws about it, but it will be impossible to carry them out.

38,372. It is not a practical policy?—No. In the long run it would be impossible to enforce.

Syed Tofail Ahmed.

38,373. So that you are not afraid that the provincial revenues would show a serious falling off?—I do not think so; with the increase of modern civilisation we do not expect any decrease.

38,374. Have you any definite proposal to make as to the source from which additional revenue can be obtained for expenditure on agriculture?—No; I do not know whether it may be done by taxation or reduction of expenditure under some other head; it must be done by whatever means are agreeable to the legislature and the Government; I do not make any suggestion, but I do say that when Government wants to do anything it can do it.

38,375. You have great faith in the Government?—In the power of Government.

38,376. *Rajah Sir Rampal Singh*: I should like to know what grounds you have for saying in the first paragraph of your note that our tenants have no more intelligence than the oxen with which they plough?—It is quite evident. Of course, a literate man is more intelligent.

38,377. Yes, of course a literate man is more intelligent, but even illiterate tenants know their own interests?—They are not prepared to accept anything new; they do not like to use new implements, and they will not give up their old customs.

38,378. Is it not within your experience that they are now freely using sugarcane mills?—Very little.

38,379. And chaff cutters?—Yes, they are. With regard to that, I have suggested that such machines should be supplied on the hire-purchase system.

38,380. But if they cannot understand their own interests, will they take such things?—These things are petty things compared with the scientific knowledge of European and other advanced countries, because so far as I have been able to learn, a peasant of an advanced country can do six times the work that our peasants can do, on account of their intelligence, and, as their machinery can do twenty times the work of a man, in that case an intelligent worker can do a hundred times the work our illiterate tenants can do. Our illiterate peasants are not prepared to adopt new machinery, and they are not skilled labourers. I mean that by the introduction of primary education we could increase the efficiency of our labourers and turn unskilled labourers into skilled labourers.

38,381. There are some men in the villages who have got sufficient primary education; have they been able to do anything?—It depends upon mass education; a few men cannot influence society; our educated men have not influenced society because they are small in number. In the villages only 1 per cent. or less of the people are literate. The general rate of literacy has been raised by the literacy of the urban population to 3 per cent., but in the villages the literacy is less than 3 per cent. Unless we raise the percentage of literacy we shall not be able to increase the efficiency of the peasants.

38,382. *Mr. Calvert*: As Sub-Registrar you have dealt with a large number of mortgages?—Yes.

38,383. Were those mortgages to any large extent on land passing from cultivators to moneylenders?—Yes, a very large number.

38,384. Is that on the increase?—Yes.

38,385. What are the usual reasons for mortgages of land passing into the hands of moneylenders?—High rate of interest, and the people not knowing how to invest in productive works.

38,386. As far as you recollect, was it frequent for a man to mortgage his land in order to get working capital for his cultivation?—Yes.

38,387. That was frequent?—Yes, both for cultivation and for marriages, and so on. When they take money from the Registrar's office they spend most of it on personal matters; very little is spent in purchasing seeds and that sort of thing.

38,388. Very little of the money raised by mortgage is used for actual cultivation?—That I cannot say definitely; I cannot say what proportion is spent on personal comforts.

38,389. In your experience, is the mortgage with the conditional sale clause still common?—No.

(The witness withdrew.)

Dr. GILBERT FOWLER, Head of the Research Department,
Government Technological Institute, Cawnpore.

MEMORANDUM.

1. *The possibility of educated middle-class Indians obtaining a living from the land. (Question 2.)*

At Nasik (Bombay Presidency) I have been associated with two educated Indians (Brahmins), one a student of my own and one a fully-qualified student from Poona Agricultural College. They had land of their own, some 11 acres being under fairly intensive cultivation. My younger son, also qualified in agriculture, being then without occupation, I took up a mortgage, after consulting the local Collector, on four acres of land, including a well belonging to the Indians aforesaid, so that my son might have an interest in the concern. I provided them with sufficient funds to procure the necessary manure, and two acres were planted with sugarcane and the remainder with wheat and sundries. The well failed, as happens once in perhaps seven years, and practically the whole crop failed also. It is evident that provision of adequate capital means that there must be enough to tide over a certain average percentage of famine years.

Such capital as my friends commanded was borrowed at 12 per cent. (except my mortgage at 8 per cent.). They worked hard against many difficulties, living in a small shanty on the farm, but the end of the story is that one brother has obtained a position as a research worker and the other is seeking for one. My son has a good appointment on a tea estate in Assam. An adjacent farmer who desired the four acres to complete his holding has taken up the mortgage, so that no loss has been sustained.

Minor experience on my bungalow compound of one-sixth of an acre has emphasised the conclusion that without adequate working capital such expenditure as is incurred is to a large extent thrown away. (Details can be given in corroboration.)

To summarise, lack of *adequate working capital* is the chief bar to success of non-wealthy middle-class Indians settling on the soil.

The difficulty is not peculiar to India. I am not in a position to give an opinion of value as to how the situation can best be met.

2. *The preparation of "composts" from various materials. (Question 10.)*

Detailed description can be given of the preparation of composts from night soil and *kutchra*, and from cattle urine and *kutchra*, weeds, &c. Actual experiments in operation can be shown to the Commission. The object of the researches has been by the preparation of a "starter" or "activated" product, in the first instance, greatly to accelerate the rate of production of the "compost."

Experiments by Dr. Rege at Bangalore, made under my direction (an account of which is submitted herewith) indicate that under controlled laboratory conditions, the nitrogen from ammonium sulphate can be converted into "organic" nitrogen in 24 hours.

Researches by Dr. Rege at Rothamsted have thrown much light on the biochemistry of "compost" production, and experiments are being made, under instructions from him in the compound of my bungalow at Nasik. It has been evident that many waste materials (dead leaves, &c.) of use for "compost" making are seldom properly utilised.

Apart from the well-known use of cowdung as fuel, the even more valuable cattle urine is largely wasted at present, but could readily be used for "compost" making under scientific control.

I would strongly recommend a general survey, district by district, wherever possible, of the potential manurial resources in cattle manure (particularly urine), night soil and *kutchra* of various kinds. Such a survey has been made for the principal towns and large villages in the Nasik district of the Bombay Presidency.

3. *The advantages of the Activated Sludge process as a preliminary to land treatment, and of the utilisation of the tanks as "dumping" tanks as a means of obviating the necessity of trenching grounds.*

The Activated Sludge process of sewage purification is now well known, but a descriptive pamphlet by Captain C. C. Adams is enclosed, together with a more purely scientific pamphlet by myself on the "Conservation of Nitrogen."

The process was officially reported upon to Government by Sir John Russell during the War, and his report was entirely favourable. He valued the sludge (dried) at about £3 10s. per ton, and when I saw him personally last year that was still his opinion. It has, in fact, been sold in quantity in the United States for that price. Its conservation is thus evidently desirable.

Statistics kindly furnished me by the Sanitary Engineer to the United Provinces show that none of the large sewage farms in the Provinces are actually treating more than a fraction of the sewage received. This is a not infrequent phenomenon in other countries, since the claims of agriculture and sewage purification cannot be made to fit.

Moreover, the direct treatment of sewage on land, unless conditions are exceptionally favourable (as *e.g.*, at Karachi) is seldom long successful. The raw sewage (often in a highly putrescent condition) makes a great demand on the oxygen present in the soil and defective aeration occurs with the well-known results. Where the land is unsuitable for sewage treatment serious disaster may ensue, as, *e.g.*, at Nagpur, where several hundred acres of good land have been reduced to a morass of sewage weed on which nothing will grow.*

The effluent from the activated sludge tank is clear and well oxidised and cannot clog the land. The sludge can be used as required, or dried and sent to where there may be a special demand, *e.g.*, among sugar planters.

To use the tanks as "dumping" tanks a local water supply would be necessary. Given that, the tanks can be so constructed that the night soil baskets can be "dumped" directly into preliminary "maerating" chamber where the contents become liquified and homogeneous before passing to the aeration tanks. In this way, the insanitary "trenching ground" in which most of the nitrogen is lost, can be dispensed with.

* A communication was received from the Director of Agriculture, Central Provinces denying that the farm was in the condition represented by the witness.

Oral Evidence.

38,390. *The Chairman*: Dr. Fowler, you are Officiating Head of the Research Department, Government Technological Institute, Cawnpore?—Yes.

38,391. Would you tell the Commission a little about the working of the Technological Institute?—It is under the Department of Industries.

38,392. Is it linked at all with the Agricultural Department?—Not as far as I know. You must understand I am not a Cawnpore official; I am only a temporary man.

38,393. On what basis exactly are you connected with the Institute? Is it on a temporary basis?—Yes. When Dr. Watson who has now passed away went on long leave I was simply asked to officiate in his place during his absence. I may perhaps inform the Commission that I am a retired Professor from the Indian Institute of Science where I was for eight years.

38,394. And then I think you undertook certain investigations in a private capacity, did you not, before you came here?—Yes.

38,395. Were you not at that time in Government service?—No. Between leaving Bangalore and coming here I had no official association with Government whatever although I worked a good deal with Government officials in Bombay.

38,396. When you were at Bangalore on what problems were you engaged?—On quite a variety of problems. My main activity—and a large part of my professional life has been spent on it—has been the purification of sewage. I developed that among other things in Bangalore. But when I first went there I was concerned with the production of acetone and general fermentation problems of all sorts, including manufacture of vinegar, for example, and in fact all the main problems that would come under the head of bio-chemistry. For five years I was Professor of Applied Chemistry, which in this country is largely concerned with bio-chemistry, and afterwards I was made Professor of Bio-Chemistry, and so I undertook all those kinds of problems.

38,397. And in the interim period between your service at Bangalore and your assuming your present responsibilities you were, I think, working on this problem of utilising sewage for agricultural purposes?—That is my hobby, if I may say so.

38,398. What range of enquiries have you been engaged upon? In the first place you have been dealing with the problem of activated sludge?—Yes; I am the representative of that process in this country though for a year I was entirely independent.

38,399. That is a proprietary process, is it not?—Yes.

38,400. Messrs. Adco & Co. are interested?—No.

38,401. What is the commercial concern with which you are concerned?—Messrs. Activated Sludge, Limited, London. I may perhaps just explain. The activated sludge process originated in the laboratories of the Manchester Corporation where I was head of the Sewage Department; we had to find some engineers who would take up the engineering side of it and that was taken up by a firm of engineers and afterwards they held a controlling interest in Messrs. Activated Sludge, Limited. I was interested in the scientific side of the whole thing and under the changed circumstances I became more closely associated with the firm.

38,402. You are still closely associated with it?—Yes.

38,403. Would you care to tell the Commission whether it is your intention to continue your association with Government if possible?—I have an entirely open mind on that matter. If the Government wishes, I am perfectly willing to make such arrangements as they desire.

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38,404. Then you have also interested yourself in the problems of making composts from various materials?—That is so.

38,405. On the Adco lines?—Yes. If I may explain, I am in close touch with Mr. Richards whom I have known for a long time. I am trying, just as in the activated sludge process, to apply some principle of activation to the making of composts. That is the essential point I would like to bring before the Commission, the making of composts in a very short time instead of the lengthy period that is now required. I have submitted to the Commission Dr. Rege's paper on the experiments done under my direction at Bangalore; in the laboratory we were able to convert mineral nitrogen into organic nitrogen in 24 hours, and what I am trying to do is to do that on a large scale process. Obviously if we can demineralise nitrogen in 24 hours and make a compost in that short time it will be an economic thing.

38,406. Now, by the system of making composts in a short period, do you produce dry material?—Yes, very nearly dry, because we shall finish the operation by piling it in heaps and letting it heat a little in order to kill all the larvæ and then it is virtually a dry powder.

38,407. Now a question or two about the opportunities for agricultural use of the products of these two processes. Would it be true to say that the product of the activated sludge method is only available for agriculture when it can be carried by pipe or conduit to the fields?—No, because we can carry, as I have explained in my evidence in chief, the night soil as it is at present carried. It is at present carried to the trenching ground where it lies so long and loses half of its value. It can be carried to wherever you want, provided you have got some water; then all the insoluble nitrogenous matter can be separated and dried in the sun or in some other way. That is a problem which is at present being considered; but it can be dried and transported as far as you like.

38,408. I followed your evidence; but I have gathered that if the transport is done in the wet stage the bulk is considerable and so the expense of carrying it is much higher than in the dry compost?—Obviously for a few miles or something like that you can transport it in that condition; but I may say that I am at present devising ways and means; in fact, since I have been here we have had experiments on the subject of drying it absolutely so that it can be sent to any distance.

38,409. So that, if these experiments work out on a large scale basis, both processes would produce a manure which would be capable of being carried by rail or road to any distance?—That is true; the activated sludge would be a more valuable manure and would contain a higher percentage of nitrogen than we are likely to get from the compost method. But still both of them would be transportable to distances.

38,410. Now on the economic side of the problem, have you anything which you could put before the Commission to show the value of these products for the purpose of manure in relation to their weight and bulk? I am thinking of your being able to compete with other forms of fertilisers?—The evidence for that I can give to you broadly. It is mainly derived in this country from the work done at Jamshedpur. I think the Commission has seen the plant there; in the early stages they did a good deal of careful work and they found that the nitrogen in the activated sludge was twice the value of the nitrogen in sulphate of ammonia because of its being in the organic form, and they came to the conclusion that from the point of view of carriage it really had advantages. I think the Commission was given the paper by Messrs. Temple and Sarangdhar in which all those figures are given. In America also some very good results were obtained. With certain crops the effect was extraordinary; they have given two or three times the ordinary yield and that was against all other forms of

nitrogenous manure. But in other cases, for instance carrots, it has no effect; I do not know why. The manure has to be suited for the crop. For instance, it has been shown at Jamshedpur that the effect on sugar cane in this country is marvellous.

38,411. Is it your view, in short, that this manure when prepared ought to compete commercially with other manures on the market and that a municipality should be able, when it is carrying out this process, to cover the expenses incurred by the sale of the product?—I do not say it would cover the whole of the expense. You have got to put down works and you have got to have sewage farms. Then I contend that by putting in the activated sludge plant as part of the scheme you get far better results from your sewage farm, your land does not become sick and the working expenses will be very largely if not entirely, covered by the advantages of the method, by the sale of the sludge and the greater value that you get out of the land.

38,412. You spoke a moment or two ago about experiments in exposing the dried product to the air in heaps by way of encouraging fermentation and destroying parasites?—I was alluding then to the compost, not to the activated sludge.

38,413. I want to ask you with reference to both the processes how far the question of rooting out the substance of parasites has been examined?—A good deal of work has been done, not directly by Messrs. Activated Sludge, Limited, but in connection with a septic tank sludge in Colombo with reference to hookworm, and the results are given in one of the Municipal Annual Reports. They found that if the material was kept for a certain time or heated to a certain temperature it became quite innocuous.

38,414. And the hookworm parasite and other parasites were destroyed?—Yes; that is so. I am at present working it out and I am not in a position to say very much about it. But I believe that, from work that I have done myself and from other directions of enquiry which are going on, it will be possible to dry the activated sludge in thin films at a very low temperature sufficient to kill the parasite without injuring the value of the sludge.

38,415. You agree that is a very important point in this country?—Absolutely; I am very keenly alive to it.

38,416. *Sir Henry Lawrence*: What do you mean by the words "some time"? Do you mean that it has to be kept for a few hours or a few days, or what?—I meant days and even weeks. This was done actually in Colombo. You can obtain the same results without artificial heat.

38,417. *Professor Gangulee*: But the temperature at which the parasitic protozoa might be killed might also affect the bacterial content, the nitrifying organisms?—Yes, that is a point which we considered many years ago, and it is possible to do one of two things, either to dry at a rather lower temperature, taking rather a long time about it, or to dry it at a higher temperature. After all, it takes a good deal of time to sterilize. The higher organisms are more quickly killed than the bacteria. But supposing we find that it is necessary to heat it at a higher temperature, then we can re-inoculate it with a little of the fresh stuff. In fact, I believe a patent was taken out which has now lapsed.

38,418. *The Chairman*: When I asked you just now as to whether the process would pay, I was thinking of course of the process beginning at the point where the normal municipal sewage system ended; so that to that extent it would pay?—Yes.

38,419. I take it that the loss in manurial value going on in India to-day is very great?—It is terrific. I think I have stated in my evidence that there has been a survey made in a great number of towns in the Bombay

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Presidency, and the amount that they recover as compared with the actual value of the material is ridiculous.

38,420. That is to say, the value of the material actually available without the need for further sewage systems to collect it?—Yes. I have based all my surveys on the experience of China, where they have had 4,000 years or more of historic experience, and I was called in to advise Shanghai on the water and sewage problems. As a matter of fact, they are putting down very big works there, and in spite of the fact that the Chinese contractors pay the city of Shanghai £40,000 for the nightsoil, in addition to which they provide all the labour for removing it, the process did not seem to be in keeping with the progress of such an up-to-date city as Shanghai. I was, therefore, called in to see what could be done, and they have, as a matter of fact, changed from the one process to the other. The Municipal Chemist says that bulk there is quite as much nitrogen in activated sludge as in nightsoil.

38,421. I recollect they used to get it in barges? Are the cultivators who remove it to other places using the activated sludge as readily?—Not as quickly, but they are trying to educate them by showing what is done in the parks of Shanghai. But naturally the ordinary cultivator would want to be shown some experiments before he could be persuaded to believe that the one thing was as good as the other.

38,422. In China, quite apart from the sewage which is available in the larger towns, it is of course the case that cultivators throughout the country make use of nightsoil according to traditional methods, by making compost on a small scale?—Yes.

38,423. And if you include those possibilities in India, then the loss on manurial values is colossal?—That is just my point.

38,424. I think you ought to know that the suggestion that you make on page 523, namely, that at Nagpur there are several hundred acres of good land which have been reduced to a morass of sewage weed on which nothing will grow, is warmly repudiated by the authorities responsible at Nagpur. On what do you found your view?—On the information that was given me at Nagpur, and I might say that I visited the place myself. It is not my statement, but the statement of the official in charge.

38,425. Made to you privately?—Yes. But at the same time from my own personal experience I was able to see that the whole place was simply covered by sewage weed.

38,426. What is sewage weed?—I am not sufficient of a botanist to say what it is, but I have had the same experience at Manchester.

38,427. Is it a specific growth?—Yes, it is quite obvious to anybody who is accustomed to sewage treatment.

38,428. Is it a rooted weed?—Yes. I am really sorry if I have said anything which has been resented, but what I have said here is based entirely on what I heard at Nagpur; and Mr. McDougall was with me at the time the statement was made.

38,429. Have you tackled the problem of persuading the cultivator in India to use the products of these various processes?—Not specifically; I wanted to get the products first. I cannot say that I have done very much in that direction. All I can say is that we did some experiments at Nasik at the municipal depôt there, and no difficulty whatever was experienced in disposing of the stuff. There is a lot of grapes growing in that district, and the grape growers there were very keen on getting it.

38,430. How about the caste objections to the use of this class of manure?—My reply to that, so far as I am in a position to reply, is this: In Banga-

lore there is great competition for the ordinary crude sewage for growing the Bangalore vegetables which are sent out as far as Hyderabad (Deccan), and here in the United Provinces we have ever so many sewage farms. The main object now is to do away with the offensive, unpleasant smell where this is dumped, so that I do not see how there can be any logical or any caste prejudices to this system, because after all the people who at present look after the sewage farm will obtain better results.

38,431. Is the dried material, the result of both these processes, offensive?—Absolutely not, and that it what makes me feel so hopeful about the whole thing. In fact it can hardly be recognised for what is originally was. It is really like humus.

38,432. What happens in times of epidemic disease? Is the use of the activated sludge on the land prohibited at such times?—In many cases it is prohibited for vegetables eaten in a raw state. As a matter of fact, no vegetables eaten in a raw state ought to be grown on a sewage farm. In Paris, for instance, that is the law.

38,433. Are any special precautions taken in times of epidemic, for instance if cholera appears in a town, to protect the public from such a thing happening?—I do not think so; at any rate, so far as my experience goes (I am not a Health Officer), I have not heard of a case in which the milk of cows was infected through the cows eating forage.

38,434. I was considering the point from the angle of view of the security of the public funds which it would be necessary to invest in the plant. If every epidemic is to be the occasion for closing down these works for so many months, that surely would be a serious handicap?—Yes; my reply to that would be that there should be a rule forbidding the officials in charge of the plant to grow any but forage crops or things like sugar-cane; in other words, to make it absolutely forbidden to grow any vegetables which are required for human consumption and which would be eaten raw.

38,435. Now then, envisage for a moment the possibilities of extending the use of these manures in their dry state to a distance: Would you put your product on the market?—Yes.

38,436. It would be futile under those conditions to lay down that that manure was not to be used for growing vegetables that were to be eaten uncooked?—No, and for that reason, before you allowed it to go out, you would have to take some precautions just as they have been doing at Colombo, because pathogenic organisms may easily be present.

38,437. You are still making experiments?—Yes. In this country before one has got to the technical process, it is very easy indeed to dry the stuff out in the sun; in fact, that is the method generally used wherever the stuff is transported, and the action of the sun is sufficient to kill all the pathogenic organisms. I have had personal experience with regard to this in an Indian sun during the sultry days of the hot weather. It was in 1909, I think, that I was investigating sewage farms in this Province, and I took some samples at Agra which I found to be absolutely sterile. So that it looks fairly good from the point of view of drying the stuff in the sun.

38,438. *Professor Gangulee*: Have you tried to interest the Agricultural Departments in sewage purification?—Yes.

38,439. Are they conducting any new experiments with regard to biochemical problems associated with sewage farms?—Mr. Anstead down in the South is very keen about the need for organic nitrogen; he gave evidence to that effect. Dr. Norris at Bangalore, since I was there, has carried out some very interesting experiments more particularly in the cultivation of sulphur organisms which will dissolve phosphates, and he has been pursuing

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various lines of research in connection with activated sludge entirely independently of me; he is at present writing a report on that.

38,440. The clearance of the effluent from the activated sludge depends on a specific organism, on the clotting enzyme for instance. Ought not the conditions of growth of these organisms to be studied?—A little work has been done already, not so much with regard to that as to the higher organisms present. That was published before the Science Congress, though not in full. There is, of course, an infinity of work to be done; no one realises that better than I do. The interest of the subject lies in the fact that you have in your activated sludge tank, in a concentrated form, exactly what goes on in fertile soil. Sir John Russell agreed with me as to that when I was at Rothamsted last, as did also Mr. Cutler.

38,441. You have studied numbers of sewage farms in this country?—Yes.

38,442. Do you think in India the standard of effluent is up to that recommended by the Royal Commission on Sewage Disposal?—No. I do not say it never is where the sewage is treated, but as it happens, through the courtesy of the Sanitary Engineer of the United Provinces I have full data with regard to sewage farms here, and as far as I can make out they are only treating 10 per cent. of the stuff that comes down to them.

38,443. You referred to land which had been injuriously affected in the Nagpur district. Do you know of any other land in India which has been similarly affected?—At Karachi there is a big and a small farm, both of them good. I saw patches of sewage sickness on the small farm; the other was unaffected. The reason for all modern sewage works, and indeed for the appointment of the Royal Commission on Sewage Disposal, was that the land eventually chokes unless you have a large area of sandy land or carry out sufficient cultivation to get the air into the soil. If you cannot get the air into the soil, things go wrong. I can speak to that from my own personal experience; I have looked after several sewage farms in Manchester and elsewhere.

38,444. *The Chairman*: Is it a colloidal condition?—Yes. You get a colloidal, slimy condition and the water will not go through. I do not say that if one was to plough and plough and plough one could not keep it open, but I have never met a sewage works manager yet who would do the ploughing I wanted him to.

38,445. *Professor Gangulee*: The Adco is a patented process?—Yes.

38,446. You cannot make adaptations of it without infringing the patent rights?—I have gone into this with Mr. Richards and with Messrs. Shaw and Wallace and Co., their agents, and they say I cannot do them any harm but can only help them. There is a chance (I have some evidence of it) that I may be able to accelerate the process; what will happen in that case I do not know, but I should think they will be pleased. I am in constant touch with Mr. Richards.

38,447. Do you use the starter recommended by the Adco process?—No, that is my contribution. They do not work on those lines at all.

38,448. They use some form of nitrate?—Yes, but that is not quite what I mean. They use what they call a starter, which is either ammonium salts or cyanamide. That is a totally different problem, and a very interesting one; I am working on it now. But that is for providing nitrogen.

38,449. You are using a different starter here?—When I speak of a starter, I mean getting the necessary bacteria in. You begin with a heap of refuse, and you add a little night soil to that. It takes a long time before the whole thing gets going, but when you have once got a big heap going and take a part of it to start another heap it gets going at once.

38,450. The activated product you are referring to in your note is not a pure culture of bacteria?—No, there may be fungi.

38,451. Do you think there are many waste materials in this country which could be used as suitable media for making composts?—My experience is that all these small towns have depots with great heaps of straw and so on. The problem I am really keen about is Bombay. We have been asked to get out plans for Bombay, where there is an enormous area to which all the *kutchra* of Bombay is sent.

38,452. Mr. Richards is trying to work with uniform material, but your idea is to work with *kutchra*?—Yes. One wants to know what one is doing, of course, and we have analysed about eight different types of weeds.

38,453. Have you worked out the cost of production of compost manure per unit of nitrogen?—No, I have not got as far as that, because that really depends on how quickly it can be done, and that we have not yet settled. We are in process of finding that out now.

38,454. That is most important?—Obviously. My idea is there is a considerable margin, because with the Nasik process the *kutchra* and night soil has to be left for six months and at the end of that time it gives very little result. There is a considerable margin for a method which costs more but which is completed in a much shorter time.

38,455. You have not gone into the economic aspects of the production of activated sludge or of compost?—We can tell you all about activated sludge. There are so many works all over the world now that we get full records.

38,456. For sludge in its dried state?—No.

38,457. That is what I meant?—That is under discussion at the moment. In America they get a price for it which I believe covers the cost of its preparation.

38,458. Mr. Calvert: Could you give us an indication of the extent to which these methods will apply to ordinary village conditions?—Where you have a sewage farm and a Corporation and so on there is no special difficulty other than the ordinary troubles everyone has to encounter. To meet the case of villages I suggest there should be some properly trained officer (a young chemist, for example) corresponding to the sanitary inspector who would be responsible for the villages in a district and see they did their best to make use of such materials as they possessed. I have suggested that a survey should be made of a number of villages to see exactly what they have available. If the thing was properly looked after by the headman of the village and the officer I have suggested, it might be possible to do something. They have always got some cattle that are not working all the time, and which could spend an hour a day stirring the stuff. It would have to be under somebody's control.

38,459. Mr. Kamat: Can you tell me whether in villages in India night soil is available in any quantity, having regard to the habits of the people?—Not in the villages, no; I understand your reference. In the case of villages I am thinking principally of cattle urine (now largely wasted) and *kutchra*. I have gone into villages in Mysore and seen paper, straw, &c., blowing about all over the place.

38,460. In the villages the only material would be *kutchra*; cowdung would not be available?—I mentioned cattle urine, not cowdung.

38,461. The villager wants to utilise cowdung for other purposes?—Yes.

38,462. Both in Nasik and in other towns in Bombay, night soil is converted at present into what is called *poudrette*?—Yes.

38,463. What is the manurial value of that as compared with the material produced by your process?—There is less nitrogen in it.

38,464. Can you give me the percentage?—The percentage of nitrogen in the case of *poudrette* is 0.7, whereas we have already got up to 3 per cent. in our experiments here.

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38,465. What is the comparative cost of your process, compared with the other?—I am not yet in a position to give that accurately; we have not yet completed our experiments. I have had to work more or less by myself; I had hoped the Bombay Government would do more.

38,466. The poudrette process may be very cheap; you are up against that?—I fully admit that. My point is that a certain amount of extra expense is fully offset by the fact that the product is obtained much more quickly, so that your capital is turned over in a shorter time. If in a month you can get a satisfactory product which contains more nitrogen than the poudrette (which takes six months to make) you have, from a *priori* considerations, a wider margin for any expense which may be involved.

38,467. *Sir Henry Lawrence*: What stage have your negotiations with these towns in Bombay reached? I am not quite clear how far you have gone in the way of putting up schemes to Karachi, Bombay and elsewhere?—There are two things we are discussing; there is the activated sludge process, which has to do with towns with a sewage system, and there is this poudrette or compost-making, which is another problem. Were you alluding to the compost-making?

38,468. In regard to Karachi, I think you yourself mentioned the activated sludge process?—I went there through the courtesy of Mr Measham Lea and he showed me the sewage farm, but I have nothing personally to do with that. I have a number of towns, such as Bombay and smaller places, that we are considering in the way of business. The compost-making is purely in the experimental stage.

38,469. Then I will ask about the activated sludge if that has advanced further. When did you visit Karachi?—Last February.

38,470. Are you in a position to offer any scheme to Karachi for adding on this activated sludge system to their present sewage farm?—Certainly; that is my private business, if I may say so; but at the time Mr. Measham Lea was content with what he had got, and I did not pursue the matter. I understand they are spending money on water and many other things, so I did not press the question.

38,471. What in your opinion would be the cost of introducing your improvements in the Karachi system?—It generally works out at a capital value of something like Rs.6 per head; I have not gone into the data of Karachi especially.

38,472. What is the recurring cost?—The recurring cost, one would hope, would be more than offset by the benefits to the crops.

38,473. But then there would be the initial outlay of Rs.6 per head which would not be recoverable?—Yes, that is my view.

38,474. Then where is the benefit to be obtained?—From the more healthy condition of the soil and the better utilisation of the sewage. At present nothing is being done; of course it costs nothing if you are not doing anything. They are doing that at Karachi, but you must bear in mind that Karachi is a very special place. They have very little rain, and what rain there is comes down in a cyclone sometimes; it is very sandy soil. Therefore if there is any place where you can deal with sewage satisfactorily as raw sewage it is Karachi; but there are many other places where they have not got anything like those facilities. For instance, at Nagpur the soil is an absolutely different proposition; it is that sticky black soil. You cannot take one place and make that the criterion for another place. As I say, I did not press the point at Karachi, though even there there were signs that the land was becoming alkaline; but there are other places where the conditions are entirely different.

38,475. Then do you say that this system would not add to the paying return of the Karachi scheme?—I looked into the matter and I must say

they did very well there; their figures would take some beating, and, as I say, I thought I would let them alone.

38,476. Now take Bombay?—That is another story.

38,477. What benefit would result from your system there?—At present the sewage is not being treated at all; it is going into the harbour and it is a general nuisance. What we want to do, and in fact plans have been got out for it, is to get all the colloidal sludge, the activated sludge from Bombay, and use it for raising crops in the vicinity or for sending away. It would then become a very big affair, and the effluent could be sent into the creek, which is the scheme with which I am most intimately concerned, without offence.

38,478. Have you proposals of that kind at the present time before the Bombay Municipality?—Yes, they have practically been agreed to. As we know, their finances are rather unhappy, but Mr. Watson of Birmingham was called in, his report was accepted and he got my firm to get out plans and estimates. We have gone thoroughly into that. It is just going to begin; it has been passed by the authorities.

38,479. Are you acquainted with the work being done at Poona on the sugarcane farm there by the Irrigation Department?—I have not actually visited it, but I know about it.

38,480. Are they working on much the same lines as you are?—No. I have not actually been there but I have read about it; I understand they use septic tanks; I know a good deal about septic tanks; they are not the most pleasant way of disposing of sewage; they pass the septic tank effluent over the land and dilute it with canal water; in that way they get their oxygen. By the activated sludge process you would get your oxygen in at the beginning by blowing it direct into the tanks, and instead of having sludge of no value and rather objectionable, which is the case with septic tank sludge, you would have a valuable sludge, and you would get as good or better results on the land without the necessity of adding so much water, which the land does not always want. That is my criticism of the Poona work.

38,481. You have got no particular proposals yet prepared for Poona?—No.

38,482. But you think you could do some good if you did prepare a scheme?—Yes, I should think so. If I may say so, I think they are going the wrong way about it to get the oxygen into the soil. They realise they must have oxygen in the soil and they get it by adding a great deal of fresh water; but then the soil does not want all that water; that is the difficulty about all these sewage farms. It is a fundamental difficulty with sewage farms that the land only wants the water at certain times, whereas the sewage comes down all the time. That is the fundamental difficulty which has been the end of practically every sewage farm. Unless it is so big, as at Karachi, and unless the evaporation is so enormous that that factor does not operate, you have that difficulty. Also at Karachi, as I say, you have very, very little rain, but anywhere where there is ordinary rainfall and where there is not a very great deal of evaporation, you have got that fundamental difficulty to contend with. If you can get the liquid portion, the effluent, clean before it goes on to the land, you can put just as much or as little as you like on the land and send the rest away, or better, make it into a pond and grow fish as the Chinaman does, and as they do in Berlin and in many places on the Continent; then you have a clean effluent that will not putrify or become a horrible lake of putrifying sewage, and you can do what you like with the sludge: you can retain it and put it on the farm there and then, or send it away.

38,483. The fish fatten on that, do they?—Yes, certainly; I have seen that with my own eyes.

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38,484. *Sir Ganga Ram*: You said just now that you could convert mineral nitrogen into organic nitrogen in 24 hours?—That has been done in the laboratory.

38,485. In what form was the mineral nitrogen?—Sulphate of ammonia.

38,486. But that is already a manure?—Yes, but the point is that a mineral nitrogen will not give the results of organic nitrogen; I think that has been fairly well proved at Rothamsted and also in the Madras Presidency. The problem therefore is to get an organic manure. The production of an organic manure is the reverse of the process of sewage purification. In sewage purification you get organic nitrogen and convert it into nitrates or ammonia. In making organic manure you take the nitrogen or ammonia; our experiments have shown that it goes through nitrates; you reverse the cycle and the nitrogen is made into albumen.

38,487. At present the municipal problem concerns three things: first, the night soil, which is more or less in a solid form; secondly, the sewage, and, of course, the sweepings will go with the night soil; and, thirdly, blood from slaughterhouses?—Yes.

38,488. At present the blood is all exported to Germany; the liquid sewage is simply turned on to the land, and when it is diluted with the irrigation water, of course it does a lot of good. Night soil is also put in the solid shape on the soil. Can you give us a process by which, on a commercial basis, we can utilise all these three things to greater advantage for the land?—That is what I have been trying to explain. You can deal with the sewage by blowing air through it; that is the activated sludge process. The blood, I think, is sold as an ordinary trade product as dried blood, and you can use it as a manure. I have used it in my compound at Nasik.

38,489. Without any mixture?—Without any mixture at all; it is simply ground up in dried powder form.

38,490. Do you not mix it with some lime or something?—No, it is sold as dried blood in a powder or in lumps.

38,491. Can you give us the commercial value of these benefits to the soil? At present the imported fertiliser can be had for Rs.6 per cwt. Will the result of your process be sold at Rs.80 a ton?—Sewage has got to go somewhere; either it goes into the river and fouls the river, or it is used on the farm; but my experience is that unless you have very good conditions, as at Karachi, it never is properly utilised on the farm; most of it goes away; where we do not know.

38,492. In the Punjab it is all diluted with either canal or well irrigation water?—What happens in the monsoon?

38,493. It is all used up. Can you tell us how we can use and get advantage from it over and above the advantage that the Municipality gets?—One would have to go into details because every part of India has its own problem. I cannot say about the Punjab. It may be possible that in your case you could dispose of it; I do not know. I would want to have all the details of the case worked out before absolutely giving an opinion, just as I have been trying to do in the United Provinces where I happen to know something, having been here in 1909. I cannot give you *a priori* what the condition would be; but you have to consider this, that in order to keep your land in good condition you will have to have a great deal of it and you have to put in a great deal of labour. If you do not, sooner or later your land will choke, as it has done in many places. Now at Jamshedpur, for example, they are getting two or three times the yield that they would get with ordinary sewage, and you have to put the value of that against the cost of the new process.

38,494. I want to know what the cost of converting that would be; the rest we can calculate ourselves?—You may take it that for a big city it will cost Rs.6 a head.

38,495. How much per ton?—That I will have to calculate; I cannot say exactly at the moment.

38,496. The second process of disposing of the night soil is practically to burn it?—That is wrong in every way from my point of view.

38,497. Could we make it into some sort of inoffensive thing and offer it in the same form?—Absolutely; I have no doubt about it.

38,498. The third process is practically mixing it with lime and burning it, I suppose?—That is, you are simply destroying it.

38,499. The specimen which you showed me in the laboratory would be too strong, I suppose, if it were given in that state?—No.

38,500. Do you mix it with something else?—No.

38,501. Would it not be too strong?—No; you will have to use it with judgment as you would use every other manure; but you see, after all, ordinary nitrogenous fertilisers contain more nitrogen.

38,502. *Sir Thomas Middleton*: When did the activated sludge process originate in England?—It is difficult to say when a new original idea originates; but we began in 1913.

38,503. Were you not working on activated sludge before that?—No; there was no such thing. I was the head of the Sewage Department of Manchester before that and I think you and I had a certain amount of correspondence.

38,504. I thought your experiments began in 1911?—That is true. They began before that. What we were really trying to do was to solve the problem of utilising cattle urine. If you recollect, that was how the thing started, through my being called in by the Duke of Westminster; he put down a whole lot of wells for cattle urine and with the assistance of a grant from the Agricultural Department we carried out some experiments at Holmes Chapel Agricultural College and we followed them up later in the laboratory. We were also working later on on activated sludge, and the Agricultural Department was interested in that and you have got in the files a number of experiments on the fertilising value of the activated sludge.

38,505. The idea of activated sludge originated with yourself in your own laboratory?—I suppose it did.

38,506. How many towns in England are using the process, the Jones and Attwood plant process?—There are 21 permanent installations in England.

38,507. Do you know whether much of the dried sludge is on the market in England?—Not much in England; but there is some in America.

38,508. What is the practical difficulty of getting it on to the market?—It is very largely a question of the Railway Companies; the carriage is so bad. The cost of it is not more than £3 a ton and however good it may be it seems difficult to get the farmers to have anything to do with manure from nightsoil. There has been a great difficulty in dealing with any kind of sewage manure. When I was in Manchester the year before last, I went into this matter with the manager of the works and he said he had done everything in the way of propaganda and the real cause of the trouble was the Railway Company.

38,509. I should have thought the real cause of trouble was the cost of getting the sludge dried?—That is also true; but even having got the product it seemed difficult to shift it. Frankly, I do not quite understand this question of the disposal of some of these products, because at one

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time you find there seems to be a tremendous demand for it. We have been asked to send the stuff to Canada, and on the other hand our next door neighbours would not touch it and it is very difficult to follow the real inside cause of these things. But you are quite right in saying that up to the present there is not a really satisfactory method of drying; but in this country it does not matter very much because you have got the sun.

38,510. That is the point; there is no difficulty of preparing the sludge here, but there is the difficulty in our country of drying it?—Yes. It makes it easier here, and I am at present working in this Institute on quite new methods.

38,511. Do you know how the Shanghai installation dries its sludge? Does it dry artificially?—It dries simply in the sun.

38,512. *Sir Ganga Ram*: Would you mix it with lime?—I am afraid you would then lose some of your ammonia.

38,513. *Sir Thomas Middleton*: Your only difficulty in drying here would be during monsoon months?—That is true.

38,514. Could it be accumulated during monsoon months?—To a very large extent I think so. You could accumulate it and reactivate it.

38,515. With safety to health?—Yes. As I say I still believe there are methods. I am at present investigating quite novel methods for drying it up.

38,516. To come to the other product, the compost, you have explained that saying that your process differs from that of Hutchinson and Richards?—I want to make their process work faster.

38,517. They use the organism in the raw material and feed it artificially?—Yes.

38,518. You put in some further organism?—I allow the organism that they develop to develop still further.

38,519. So that your process involves a fresh starter for each heap?—You make one per cent. of the one and 10 per cent. of the other and start a new one.

38,520. My question is, does that starter keep? Could you transmit it from one place to another?—That is an interesting question which I am not prepared to answer at once; but I say yes. You know it is exceedingly difficult to sterilise material of that sort. It may be done just as we used to do in the very early stages with septic tank sludge.

38,521. But if you are depending on a starter method, you must have some starter which can be readily used?—It only takes a few months to start it and make your starter readily available in the same way as in the activated sludge tank. Having got it once you can go ahead.

38,522. Do you remember the percentage of nitrogen in your dry sludge; what does it vary between?—Between 4 per cent. and 8 per cent.

38,523. What is the sort of variation in your compost?—That is much less, but I have not got sufficient experience to say that; but I think it varies between .7 and 3 per cent.

38,524. I should have thought that if it were so low a percentage of nitrogen as .7 it will be difficult to make your process work?—I have got here the analysis made at Poona of the stuff that we made by this process at our Nasik depot.

38,525. What is the class of material in which you have to work in order to get the best result? What amount of material derived from nightsoil is necessary and what amount of material from vegetable sources?—One would say perhaps something like 10 to 1, or something like that.

38,526. Ten vegetable to one of the nightsoil?—Yes, roughly; I am not quite sure.

38,527. *Sir Ganga Ram*: There is an enormous amount of rank grass on the banks of canals? Could that by some process be converted into organic nitrogen?—Yes, it is very excellent stuff indeed; in fact it was with grass that we got the 24 hour result.

38,528. You say in 24 hours it can be converted?—I have not done it except in the laboratory. I say it is scientifically possible, but whether it is so in practice I do not know.

38,529. Could you give me an idea of what the cost would be?—It is simply a question of the available labour I imagine. You have simply got to send a group of coolies out to collect it.

38,530. But after collection what would it cost to convert it into organic nitrogen?—I am not in a position to answer because I have not finished the experiment yet.

(The witness withdrew.)

*The Commission then adjourned till 10 a.m. on Saturday,
the 12th February, 1927.*