

**The Mysore Agricultural & Experimental
Union**



**Note on the Report of the Royal Commission
on Agriculture in India**

BY

Leslie C. Coleman, M.A., Ph.D.
Director of Agriculture in Mysore

BANGALORE CITY :
THE BANGALORE PRESS, MYSORE ROAD
1929

CONTENTS.

	Pages
CHAPTER I*—Introduction	1 — 2
CHAPTER II—Historical Retrospect	2
CHAPTER III—The Organization of Agricultural Research	2 — 6
CHAPTER IV—Agricultural Improvement .. .	6 —16
CHAPTER V—The Sub-division and Fragmentation of Holdings	16—19
CHAPTER VI—Demonstration and Propaganda ..	19—30
CHAPTER VII—Animal Husbandry	30—47
CHAPTER VIII—Forests	48—55
CHAPTER IX—Diseases of Live-Stock and their Control	55—60
CHAPTER X—Irrigation	61—70
CHAPTER XI—Communications and Marketing ..	70- 76
CHAPTER XII—The Finance of Agriculture ..	77—85
CHAPTER XIII—Co-operation	85—88
CHAPTER XIV—The Village	88—93
CHAPTER XV—Education	94—108
CHAPTER XVI—Rural Industries and Labour ..	108—111
CHAPTER XVII—Horticulture and Plantations ..	111—114
CHAPTER XVIII—Statistics	114—117
CHAPTER XX—Miscellaneous	117—118

* The Chapter numbers refer to the Chapters of the Report of the Royal Commission.

*Reprinted from the "Journal of the Mysore Agricultural and
Experimental Union", Vol. X, Nos. 1 & 2.*

**Note on the Report of the Royal Commission on
Agriculture in India.**

BY

Dr. Leslie C. Coleman, M.A., Ph.D.,

Director of Agriculture in Mysore, Bangalore.

The purpose of this note is to consider the recommendations of the Commission in the light of Mysore conditions, to indicate how far those recommendations have already been carried into effect and what changes in the organization or policy of the Mysore Agricultural and related Departments are required. The Report will be considered chapter by chapter. The space devoted to the respective chapters of the Report is not to be taken to indicate my conception of their relative importance. It indicates rather my familiarity with the various subjects discussed.

CHAPTER I.

Introduction.

This introductory chapter describes briefly the conditions governing life in the Indian village and the changes which have been brought about by the establishment of a definite system of land revenue, improvement of internal and external communications and the development of irrigation works. It then discusses the present

agricultural position pointing out that the undoubted increase in agricultural production which has taken place during the past fifty years has been largely the result of the spread of cultivation although the expansion of irrigation and, to a much lesser extent, the introduction of improved varieties have played a part in this increase.

The last paragraph of this chapter indicates the scope of the enquiry as being much wider than that of the organization and work of the agricultural departments. The enquiry was extended to the activities of all departments which are concerned with rural welfare.

CHAPTER II.

Historical Retrospect.

This chapter traces the development of work connected with the improvement of agriculture in British India. This historical discussion ignores entirely the pioneer work done in Indian States of which Mysore must be considered a leader. However, as a short historical account of agricultural development in this State has already been printed, it is unnecessary for me to deal with the question here.

CHAPTER III.

The Organization of Agricultural Research.

In chapter III, the Commission, after a consideration of the organization of agricultural research in Canada, Australia and the United States, consider the question as applied to India. The proposals for the formation of an Imperial Council of Agricultural Research and other organizations connected with it would seem to have for us, at present, little more than academic interest as it is by no means certain that Indian States will have any representatives on the various bodies proposed.

The proposal to form provincial committees to serve as co-ordinating agencies between the Imperial Council and the provincial departments of agriculture might possibly be considered by us were there any likelihood of our having representation upon the Imperial Council. We have, it is true, our Board of Agriculture but it hardly corresponds either in personnel or functions with the provincial committees proposed. The suggested personnel, consisting as it does of the Director of Agriculture, the Director of Veterinary Services, Principals of Agricultural and Veterinary Colleges where these exist,

scientific experts from the staff of the agricultural and veterinary departments, a representative of pure science from the provincial university and one or more non-official members indicates a smaller and more technical body than our Board of Agriculture. The suggested function of preparing a programme of research to be laid before the Imperial Council is one which, I think, hardly comes within the scope of the present Board of Agriculture. In fact unless our agricultural development work is to be co-ordinated with that in British India, there does not seem to me much purpose in the formation of a separate committee here and I shall therefore not deal further with the matter.

For us probably the most important section of this chapter is that which deals with the position of the Universities in regard to Agricultural Research. Briefly stated, the Commission consider that an association of the science departments of the universities in agricultural research should lead to very valuable results. It may be said that practically nothing is being done in this direction in Mysore at present. This is not to indicate that there is no intercourse between the research staff of the Agricultural Department and the scientific department of the University. As a matter of fact, almost every year for the past twenty years students have come from science departments of the Central College to work as voluntary assistants in our laboratories with the avowed object of obtaining higher training. Among these may be mentioned two who have since become professors in the University—Dr. M. A. Sampathkumaran and Dr. A. Subba Rao.

This intercourse has been of a rather casual and at the same time of a quite unofficial character and the question as to whether a definite scheme of co-operation could be developed is, I think, worthy of serious consideration. I have already discussed this in a preliminary manner with Dr. Metcalfe and with the heads of scientific sections of this department and have found a general agreement that a closer co-operation between the University and the Agricultural Department in research work should lead to valuable results.

The subject may be considered under three heads: (a) Team work by members of the staff of this department and the scientific staff of the University on problems where such combined effort seems to be desirable; (b) research work on scientific problems connected

with agriculture by members of the scientific staff of the University ; and (c) research work by graduate students of the University on similar problems.

In regard to (a), I believe there are a number of problems upon which team work might lead to fruitful results. Thus there are many soil problems where the help of the physicist would be highly advantageous and, as a matter of fact, at least one department of agriculture in India has already a soil physicist on its scientific staff. While we have an excellent chemistry section it seems quite probable that in connection with some problems, more rapid results would be obtained by an association of the chemical staff of the University in the work.

Quite possibly similar team work in connection with problems in entomology, plant pathology and botany might be advantageous while it seems also likely that an association of the economics staff of the University with the staff of the Agricultural Department in the investigation of problems connected with agricultural economics might lead to valuable results. That such an association might benefit the University itself by bringing it more closely into touch with problems of vital importance to the economic life of the State seems certain. I am doubtful, however, if it would be possible or advisable to lay down rules to govern such co-operative research work. Possibly the formation of a research committee on which the staff of the University and the Agricultural Department would be represented might serve a useful purpose in this connection. I shall refer to this later.

In regard to (b), I am given to understand that the staffs of the scientific departments of the University and, more especially, the junior members, are being encouraged to take up more or less independent research work. From my own recent experience as a research professor in Canada and from conversation with Dr. Metcalfe I am led to believe that there is at times difficulty in the selection of suitable problems and that the problems chosen have frequently very little reference to the needs of the country. I fully appreciate the value of work in pure science which has no immediate relation to practical problems and I would not for a moment suggest that any restriction should be placed on the choice of subjects for research work in the scientific departments of the University, but I feel strongly that

where the scientific problems connected with agricultural improvement are so many and scientific workers so few as they are in India, the attention of scientific workers in the universities should be drawn to these problems. I would suggest, therefore, that a list of problems should be prepared by the scientific staff of the Agricultural Department for consideration by the scientific departments of the University in connection with the choice of research problems.

In regard to (c) while I am aware that the University does not at present provide courses leading to higher degrees, I understand that some students do commence their graduate studies in the University and they thereby are enabled to shorten considerably the time required for study in Indian universities which grant higher degrees. I believe also that the University provides graduate scholarships for such men.

The facilities available in the laboratories of the Mysore Agricultural Department for research work in science as applied to agriculture are, I consider, excellent. It has occurred to me, therefore, that the University might be able to send graduate students to the department for training in research providing scholarships for the purpose. These young men could be placed at work on some of the many problems upon which at present no work can be done owing to insufficiency of staff. I believe that the scientific reputation of the department is sufficiently high to ensure the acceptance of such work as part fulfilment of the requirements for higher degrees in universities such as Bombay and Calcutta. Such an arrangement would, I believe, react favourably on the work of the science departments of the University while it would at the same time bring the Agricultural Department into close touch with some of the most promising young men trained in the University. The problems we have to face in connection with agricultural development in Mysore demand the very best material in the way of research workers that our University can produce and an arrangement such as I suggest should considerably widen our field of choice for men to fill scientific posts in the department.

I have already suggested that it would be necessary to form a research committee to regulate and control the proposed research activities. Such a committee would consider the research problems

from the standpoint of their relative importance and from that of the facilities available either in the laboratories of the University or in those of the department for their investigation. They could also make recommendations as to the award of scholarships to graduate students. It might, I think, properly consist of the Principal, Central College, the Director of Agriculture, the professors in charge of scientific departments in the University and the heads of scientific sections in the Agricultural Department. Provision could be made also for sub-committees to deal with the subjects relating to the particular sciences involved.

CHAPTER IV.

Agricultural Improvement.

Chapter IV, dealing as it does with the general subject of agricultural improvement from the standpoint of crop production, is one of the most important in the Report.

After a short discussion of the crop seasons and the principal crops grown in India the question of soils is considered. The characters of the main soil types, *viz.*, (a) red soils of the crystalline tracts (including our typical ragi soils), (b) black cotton soils (such as are found in Chitaldrug district), (c) alluvial soils (hardly to be found in Mysore except in tank beds), and (d) laterite soils (such as are found typically in the *melnad* regions of Shimoga and Kadur districts) are presented and their deficiencies from the standpoint of crop production are discussed. There is nothing in this discussion which is particularly new to us and I think it is safe to say that our chemical section is doing as valuable work in regard to the plant food requirements of our soils as can be found in any part of India.

The Report considers in this connection the question of soil surveys, a question which has been discussed at various times in Mysore. The general conclusion reached that the large amount of money and the extensive staff required for a soil survey on the lines being followed in the United States, places the institution of such a survey out of the question in British India at present, is, I believe, a sound one which applies with equal force to Mysore. I have already on more than one occasion expressed this view.

There is, however, much to be said for the suggestion made in the

Report that the information already obtained should be collated and studied with a view to publication. We have in Mysore most excellent survey work which has been done by the Geological Department. The information collected by that department could, I think, be very usefully correlated with that which has resulted from the soil analyses carried out by our chemical section. I would suggest in this work a consideration of the possibilities of closer co-operation between the Agricultural and the Geological Departments. The recent establishment of a separate chemical laboratory in the Geological Department while undoubtedly possessing many advantages will, I fear, not tend to develop a spirit of co-operation. I propose with the approval of Government to approach the Director of Geology with the object of ascertaining just what can be done to bring about the pooling of our information as regards rocks and soils for the benefit of the State.

The Report next considers the frequently discussed question of the deterioration of soils in India. The general conclusion reached on the basis of experimental data and on the results of general observations is that in the case of an overwhelming proportion of the agricultural lands in India a more or less stabilized condition has been reached and that no further deterioration is likely to take place under existing conditions of cultivation. This conclusion, I believe, applies to Mysore and the belief that our channel-irrigated areas are becoming progressively more impoverished has, I consider, no foundation in fact.

The reason for this stability lies in the fact that the varieties of crops at present grown are of a grade of efficiency which is closely adapted to the environment. In other words they take, on the average only so much from the soil as is added either in the way of manure or in the way of fixed nitrogen coming from the air through rainfall or through the action of soil organisms. Where, as at present, we are attempting, through breeding, to produce more efficient varieties which give higher yields under the same conditions, it seems to me inevitable that if the increased draught on plant foods is not made up by an increased return to the soil in the way of manure, there will be a gradual, if almost imperceptible, reduction in soil fertility. It was this consideration which, as long ago as 1917 in my presidential address before the agricultural section of the Indian Science Congress, compelled me

for the first time in India, to emphasize the danger of the introduction of higher yielding strains of crops if one did not at the same time take steps towards a more adequate manuring of our soils. The Report deals with this subject in a very cautious and I feel inadequate manner. I look upon the introduction of a higher yielding variety of any crop as an almost essential first step in introducing agricultural improvements, for it is the step that can be taken with the least additional expenditure on the part of the ryot and is, therefore, the one which is most certain to appeal to him however ignorant he may be. I am firmly convinced, however, that unless it is followed up by intensive work towards the increasing of soil fertility, the permanent improvement will be nil if indeed the work does not lead to a final reduction in crop production. I am glad to be able to say that this important consideration has not been lost sight of in Mysore and that we are spending on our soil and manurial experiments relatively a greater proportion of our total budget than is being spent in any other part of India. In fact this branch of our activities has received perhaps more than its due share of the inadequate allotments which have been provided for agricultural development in the past.

The Report considers some of the main lines of work in connection with a study of the conditions governing the fertility of different types of soil and emphasizes the importance of the employment of soil physicists, bio-chemists, physical chemists and bacteriologists along with the regular agricultural chemists in the investigation of these problems. In the British provinces steps are being taken to provide investigators in some, if not all, of these lines. The expense involved will, I believe, preclude the possibility of expanding our activities in all these directions in the near future more especially as problems of more immediate practical importance such for instance as the breeding of improved varieties of crops and the improvement of our live-stock are pressing upon us. However, if we can enlist the co-operation of the scientific staff of our University in the way I have suggested above I believe that much valuable work can be done with a comparatively small expenditure of money.

The subject of soil erosion which is next dealt with is I consider, one of no very pressing importance in Mysore. Where it occurs it is commonly on land which is not cultivated and which in most cases at

present lies far beyond the margin of cultivation. It is a matter perhaps worthy of investigation by the Forest Department as to whether afforestation of areas which show most striking evidence of soil erosion is feasible.

The question of fertilizers is dealt with at considerable length introduced by a discussion of loss of plant foods by the burning of farm yard manure and the export of oil-seeds. Nothing very new can be said on these subjects but it may be noted that the Commission are opposed to the levying of an export duty on oil-seeds, bones or other sources of plant foods, a position which I have taken from the first. While much emphasis is rightly laid on the value of manurial experiments and the importance of continuing them over a long series of years I believe the work in this regard in Mysore is being conducted on sound scientific lines and I, therefore, do not propose to devote attention to it here.

In connection with farm yard manure the Report emphasizes the difficulties of promoting its more extensive utilization on the soil until other sources of fuel which are equally cheap can be made available. The question of fuel plantations is discussed but the Commission admit that these can have but a limited usefulness. The problem of the better preservation of cattle manure including the making of composts in pits is one which will be solved very slowly, and is largely a matter of education. I would suggest, for the sake of the improvement of village sanitation as well as for that of the conservation of our manurial resources, that the construction of proper manure pits should form an important item in the programme of all our village panchayats. If the importance of this simple and inexpensive improvement can be impressed on these panchayats a real step in advance will have been made. The question of the manufacture of artificial farm yard manure in a country like Mysore where at least as regards our maidan areas practically all our plant refuse is used either for fuel or fodder, is one which I consider of but little practical importance. A consideration of the better utilization of night soil is also, I feel, a question which should take second place to much more urgent ones.

As regards green manures the Report has nothing new to say. They point out the difficulties of spreading the use of green manures where such spread would entail the loss of a secondary crop, a

condition which commonly obtains. From the standpoint of Mysore probably the most promising line of advance will be through the encouragement of the planting of manurial trees such as *hongé* along the banks of channels and on lands which are on the margin of cultivation. A good deal of our village *gomal* which is now little more than exercising ground for cattle could be used profitably in this way. I believe that this is another phase of agricultural improvement which might well be included in the programme of many of our village panchayats.

As rightly pointed out by the Commission the utilization of oil-cakes in the country can be soundly stimulated not through the imposition of export duties but by the expansion of the oil crushing industry and by the demonstration that the cakes so produced can be profitably utilized as manures and as cattle feeds. The expansion of the oil crushing industry will, it seems, depend largely upon the more extended use of vegetable oils for consumption and for manufacturing purposes in the country—a development which is likely to come but gradually ; as to the use of oil-cakes as feeding stuffs for cattle that is very largely bound up with the improvement of our cattle so as to make the use of such cattle feeds economically sound. This is a matter which I have touched upon elsewhere and to which I will return.

The consideration given in the Report to the use of artificial fertilizers in India is, I believe, quite inadequate. For instance, the statement made on page 90 of the Report in connection with one of the most important of these, ammonium sulphate, that its price (notwithstanding the great reduction since the War) is still sufficiently high to preclude its application to any but the most valuable of the cultivators' crops such as sugarcane and garden crops, is directly contradicted by experience. It seems perfectly clear that these fertilizers are destined to play a very much more important role in our agricultural development than the Commission have foreseen. Fertilizers such as ammonium sulphate and superphosphate are now being used to a rapidly increasing extent on paddy—a crop which can certainly not be classed among the most valuable. We have, in fact, some grounds for the belief that their use on such important dry crops as ragi and jola will prove economically sound in many parts of the State. If further experiments and tests on private holdings should

substantiate this view, the demand for these fertilizers will be enormous and the effect upon our production almost incalculable. The introduction of fertilizers such as ammophos and diammonphos which provide nitrogen and phosphoric acid in a combined form at a price no greater than is charged for these plant foods in separate fertilizers such as ammoniumsulphate and superphosphate and which, at the same time, cut the transport charges in half, is one of the most interesting recent developments from which I anticipate much. It would be a great pity if the ultra-cautious view expressed by the Commission were to lead to the diverting of attention from this important phase of agricultural improvement. I personally anticipate a more rapid increase in crop production in Mysore during the next few years through an extension of the use of commercial fertilizers than through any other means. The Mysore Agricultural Department at least will not be deterred from giving marked attention to this phase of agricultural improvement by the Commission's remarks in this connection.

The proposals put forward at many times in India and in Mysore to manufacture artificial nitrogenous fertilizers in this country are rightly rejected by the Commission in the light of the very rapid large-scale developments in other parts of the world. Questions connected with the utilization of bone meal, fish manure and natural phosphates can, I feel, be passed over as being of no great importance to us. The Commission are opposed to legislation against the adulteration of fertilizers upon what appear to be sound grounds.

They draw attention to the recent decisions of railways to reduce freight rates on oil-cakes and manures as a step in the right direction and emphasize the importance of further reductions as soon as the volume of traffic on these commodities will warrant it. In this connection I should like to draw attention to a proposal which has been recently made favouring differential rates in Mysore on oil-cakes as compared with artificial fertilizers. As I have pointed out already in an unofficial note, this would, I consider, be a retrograde step likely to do much more harm than good.

An interesting and important section of this chapter is devoted to the question of the introduction of improved varieties of crops. An examination of the table given on page 95 of the Report indicating the extent to which improved varieties have been introduced into

British India shows that as far as the three crops, *ragi*, cotton and sugarcane so far dealt with in Mysore are concerned we are in advance of the average percentage of improved varieties to total crop and this notwithstanding the fact that our breeding section has been hopelessly undermanned and inadequately equipped.

We are, however, decidedly behind some of the British provinces in the variety of our breeding work and this should be remedied as rapidly as possible. Breeding work on paddy and *jola* is very urgently required. Other crops which should receive early attention are *kar ragi* and the various oil-seeds and pulses which form such an important feature of our crops. The recently sanctioned increase in the staff of the botanical section will enable us to expand breeding work but further expansion is still urgently required. The provision of a highly trained officer for work on each major crop is what is really required. It will take some years before we can reach that goal.

While the Report tells us little new in regard to the actual breeding work it makes an extremely valuable suggestion in connection with the distribution of improved varieties. The Commission have been impressed with the great difficulty in getting the results of the plant breeders' work on to the fields of the ryots in anything like a pure state. The difficulties in this connection are considerable in any country but are particularly great in India where individual crops are grown on small plots, the stacking is commonly in one place and the threshing is frequently done on a threshing floor common to several different growers. All of this leads almost inevitably to mixing when a new variety is brought into a village, for it is very rarely that it can be introduced at once on a scale so as to give it more than an insignificant portion of the land devoted to that particular crop. *Ragi*, from the size of the grain and the ease with which these grains can be shifted by the wind or other agency after sowing in the field or after harvesting on the threshing floor, is a particularly difficult crop to keep pure. The fact that supervision over seed supply is difficult after it has once left the Government farms and the further fact that the district staff have a large amount of other work to do much of which is likely to bring them more immediate recognition than would be the painstaking control of seed supply, has led to the dissipation of much valuable material and the waste of much effort.

The following are the most important suggestions of the Commission in connection with seed supply :—(a) the multiplication of seed farms, both Government and private, for the supply of pure seed, (b) the utilization of co-operative agency in this connection wherever possible, and (c) the formation of a separate organization for supervising the distribution of improved seed and for testing its purity in the field and its germination in the laboratory. The Commission recommend that this organization should be under the control of a Deputy Director working under the Director. I am inclined to think that at present an officer of the grade of Senior Assistant or Assistant Director should meet our immediate needs and would be inclined to have his office attached directly to the botanical section. This officer would, in addition to supervising work on Government and private seed farms, assist in the work of developing co operative agencies for seed distribution and would also have charge of all seed testing. The employment of such an officer has recently been sanctioned by Government.

The next important subject dealt with in Chapter IV is that of agricultural implements and agricultural engineering. The Commission emphasize the fact that, up to the present, this branch of agricultural work has been treated in quite a different manner from the others. The officer in charge has been, in almost all cases, an engineer who has had no particular agricultural training and no experience in the designing or adapting of implements. Moreover he has usually been placed on a lower scale than that of the heads of other sections and has had charge of well-boring as well as implement designing a much too large and varied task for one man. They recommend the separation of pumping and boring operations from those on agricultural machinery and implements and the employment of men specially trained for the work in both of these sections.

Let us see how we are situated in Mysore. We have, at present, one Engineer—an officer who was transferred from the Public Works Department in 1915. He had for two years, from 1919, an engineer assistant who relieved him of most of the teaching work in the Hebbal School but this post was later discontinued. In 1924 a beginning was made towards the organization of a pumping and well sinking section with an assistant engineer in charge but, shortly after my departure

on leave in 1923, this embryo organization was transferred to the Industries and Commerce Department. We are therefore now where we were in 1924. The one officer has to do all the teaching of agricultural engineering in the Hebbal School, work sufficient to keep one man employed. In addition he is expected to prepare plans for buildings of all sorts in the various farms and to answer requisitions for assistance from private parties as regards irrigation and drainage. The question of designing and adapting implements is also supposed to be engaging his attention.

The position as far as engineering work is concerned is, I consider, an almost hopeless one. The appointment of an assistant engineer recently sanctioned by Government will help in a small way and I propose as soon as this officer is appointed to have the Agricultural Engineer, devote his attention to the machinery question as regards designing, adapting and testing but the organization for this purpose will have to be greatly strengthened and enlarged if we are to meet the situation at all adequately. As regards the introduction of improved agricultural implements I think we may safely say that per head of agricultural population and per acre of cultivated land more has been done in Mysore than in any other part of India. Our organization in this regard provides, in a fairly adequate manner, implements as suitable for our conditions as are available in India and a supply of spare parts which enable purchasers to keep their implements in working order. Two of the light ploughs introduced first into Mysore are among the very best of their kind and it is interesting to note that one of the large Indian firms of implement manufacturers is now turning out these implements at prices considerably below those at which we have heretofore been importing them. Whether these will prove satisfactory has yet to be ascertained.

If we turn to the question of well irrigation in the State we find nothing is being done. The Industries and Commerce Department is quite rightly devoting its well-boring activities to the furnishing of drinking water wells in villages,—a very important matter. However from a purely economic standpoint I doubt if it is any more important than the improvement of well irrigation facilities. A very large number of our wells are too shallow to be of use when they are most urgently needed and their number is quite insufficient. Most of

our tanks hold inadequate supplies and no year goes by without the loss, owing to failure of tank water, of valuable crops such as sugarcane which would have been saved had irrigation from subsidiary wells been available. Much of the money now being spent in sinking wells is wasted because of the lack of adequate knowledge on the part of the ryots. Only too frequently no accurate estimate is made of the cost involved in sinking a well to a proper depth with the result that work is stopped before any useful supply of water is obtained owing to lack of funds. The scheme submitted by me to Government as long ago as 1923 should, I consider, be revived and a real effort made to improve our position as regards well irrigation in the State.

In connection with both aspects of agricultural engineering here discussed it appears to me that the resources in men and equipment of the Department of Industries and Commerce and the Department of Agriculture might well be pooled. I speak with some diffidence on this subject as it concerns another department of Government. If facilities could be made available in the Industrial Workshop for carrying out the construction of freshly designed implements and if a scheme for co-operation in well sinking could be worked out it should lead to a decided saving of money. This would require a much closer co-ordination of work of the two departments than at present exists.

The question of power cultivation discussed briefly in this chapter hardly need detain us. I have all along been convinced that the use of tractors in this State can play no very important role in agricultural development for many years to come and notwithstanding the reduction in price and increase in efficiency of machines I see no reason to change my views.

The question of railway rates on improved agricultural implements has already been considered sympathetically by our State Railway authorities as it has in British India and I have no doubt that with the expansion of business further reductions will be made. The question of the reduction of the import duty on iron and steel used in the manufacture of agricultural implements concerns us only indirectly.

The remainder of Chapter IV deals with the question of crop protection from fungus diseases, insect pests and wild animals. In this direction the Report has nothing new to say and I have no

comment to make except that here as in other spheres of activity there will have to be gradual expansion.

CHAPTER V.

The Sub-Division and Fragmentation of Holdings.

The questions discussed in this chapter have, as is well known, received much attention in India during the past fifteen or twenty years. The Commission classify the problems involved as follows :—

1. The sub-division of holdings of right-holders.
2. The sub-division of holdings of cultivators who may or may not be right-holders of the whole or part of the land they cultivate.
3. The fragmentation of the holdings of right-holders.
4. The fragmentation of the holdings of cultivators.

The evils of sub-division lie mainly in the reduction of the holdings to areas so small that they cease to furnish a living for the families of the holders or cultivators. The latter are thus compelled to live under conditions little above starvation or to eke out their living through subsidiary occupations. As sub-division results from the laws of inheritance common in India there is obviously no effective way of checking it except through legislation. Even were this possible the result would be the dispossession of the younger members of the family who would be forced to find employment elsewhere. With the primitive industrial conditions that exist in India this would almost certainly lead to a position worse than that now existing. Unless and until there is a very marked industrial development in the country any legislative restriction on the sub-division of holdings seems to be out of the question even were public opinion not opposed to it. It seems therefore to be a subject hardly ripe for profitable discussion.

The case of fragmentation of holdings is different. Here although the total area of the holding may be sufficiently large for the support of a family in moderate comfort, it may be split up into a very large number of small blocks or strips situated at considerable distances from each other. Conditions such as these lead to waste of both labour and land and militate greatly against the introduction of improved implements which usually require an area of several acres in one block to allow for their economic utilization. As to definite losses due to fragmentation, the Report gives the interesting information that in the Punjab, the results of consolidation indicate that five per cent

of the land which would normally be cultivated is lying useless owing to fragmentation being so excessive as to prevent any agricultural operations, while another one per cent is lost in boundaries which could be abolished on consolidation. To quote further from the Report, "Even where cultivation is possible, fragmentation involves endless waste of time, money and effort; it restrains cultivators from attempting improvements; it enforces uniformity of cropping and especially restricts the growing of fodder crops in the period when cattle are usually sent out to graze on the fields. The total effects are great and it is only when the burden is removed that the full results this evil practice has produced are revealed."

The great evil lies in the fragmentation of cultivation not in the fragmentation of actual holdings but as it seems impossible to control the leasing of land to tenant farmers the only way to tackle the problem is to attempt a consolidation of the areas owned by right-holders. In fact any measures tending towards consolidating the holdings of right-holders would be certain to affect favourably the areas cultivated as well.

The consolidation of holdings is being attempted in India in two ways: (a) through co-operative effort, and (b) through legislative action. In the case of co-operative effort consolidation is purely voluntary and requires an immense amount of patient and persistent work on the part of the officers concerned. In the Punjab, where this method of consolidation has been successfully introduced, a total of 98,000 acres in 314 villages had been consolidated during a period of seven years up to and including 1927 and at a cost varying from Rs. 1-6-0 to Rs. 2-11-0 per acre, a very reasonable figure. It must be noted, however, that the conditions for this type of work are particularly favourable in the Punjab owing to the comparative homogeneity of the soil and the simplicity of the tenure. In Mysore, where the soils in villages are rarely homogeneous, the difficulties in the way of co-operative consolidation would undoubtedly be much greater.

Permissive legislation for the consolidation of holdings has been introduced in the Central Provinces where some success has already been achieved in the Chhattisgarh Division without the assistance of the Co-operative Department. The chief feature of the Act is stated to be the power it gives to a proportion of the right-holders of a village

which must not be less than one-half, holding not less than two-thirds of the occupied area to agree to a scheme of consolidation which, if confirmed by them, becomes binding upon all the permanent right-holders in the village and their successors in interest. This apparently follows, in all essential respects, legislation which has been introduced with great advantage in Japan and in certain countries of Europe. A discussion of the legislative enactments in Japan and Europe with the results obtained will be found in a note submitted by me to the Economic Conference in 1919 and published as Bulletin No. 2 for 1918-19 by the Agricultural Committee of the Conference.

As regards the sub-division of holdings in Mysore we are apparently in a more favourable position than most parts of British India. The following table taken from the Report shows the average size of holdings in the various provinces and to this I have added the figures for Mysore calculated from data given in the *Season and Crop Report* for 1926-27 :—

NUMBER OF ACRES PER CULTIVATOR.

(*Indian Census Report, 1921*).

Province.	Area.
Bombay .. ..	.. 12.2
Punjab .. ..	.. 9.2
Central Provinces and Berar	.. 8.5
Burma .. ..	.. 5.6
Madras .. ..	.. 4.9
Bengal .. ..	.. 3.1
Bihar and Orissa .. ..	.. 3.1
Assam .. ..	.. 3.0
United Provinces .. ..	.. 2.5
Mysore .. ..	.. 7.5 (1926-27)

From this it will be seen that there are only three provinces which have an average area per cultivator higher than Mysore while seven have a lower area.

When we come to the question of the fragmentation of holdings we have, as far as I am aware, no data similar to that which has been collected in other parts of India more especially in the Punjab, Bombay and Madras. While every one who has made any study of agriculture

in Mysore knows that fragmentation exists and while probably our conditions are very similar in this regard to those existing in neighbouring parts of British India, I believe that a survey of typical areas is advisable before we proceed to a consideration of possible action. I would suggest the possibility of utilizing the services of the district economic superintendents and also the agricultural inspectors in making such a survey. It should be possible for an agricultural inspector to make a survey of at least one village in his range each year without seriously interfering with his other work, more especially if a definite plan of operations were laid down for him. The organization of such a survey might well be one of the functions of a Board of Enquiry reference to the establishment of which will be found later in this note. The services of the district economic superintendents and possibly those of co-operative inspectors could be utilized in a similar manner. Maps showing the extent of fragmentation should, of course, accompany all reports of survey work. In this way it should be not impossible to make a survey of at least fifty villages in one year with little, if any, extra expense to Government. I would suggest this as a proposal to be considered seriously by the Agricultural Board in the near future. If, as I suspect, it will be found that conditions are sufficiently serious to warrant definite action, I would suggest the possibility of attempting co-operative action on the lines worked out in the Punjab more especially in areas where rural co-operation has made real progress. In anticipation of such action I would recommend that surveys with reference to fragmentations should be confined as far as possible to villages where co-operative effort seems most feasible and where there is likely to be the least amount of trouble on account of lack of homogeneity of the soil. I would not favour an attempt at legislative action until the possibilities of co-operative action have been thoroughly explored and until efforts towards co-operative consolidation have shown that this method is unsuitable to Mysore conditions.

CHAPTER VI.

Demonstration and Propaganda.

So much has been said and written in the past twenty years on the subject of how best to bring agricultural improvements to the attention of cultivators that one could hardly expect the Commission to

make any very startlingly new recommendations in this direction. I think it may be said at the beginning that an examination of the work of the Mysore Agricultural Department in the light of this chapter will indicate that our demonstration work is being carried out on sound lines.

After discussing at some length the fairly obvious difficulties confronting agricultural officers in a country where agriculturists have to be reached almost entirely through ocular demonstration, the Commission discuss the relative merits of the demonstration farm and the demonstration plot on the ryots' own fields. They come to the obvious conclusion that a demonstration in the village on a ryot's own field, if it is properly carried out, is likely to have a much greater effect than if it were conducted on a farm run by Government. Such plot demonstrations are also certain to be much cheaper while they are capable of much greater extension. These views have governed the policy of the Mysore Agricultural Department from the first.

The Commission strongly oppose the suggestion that experimental farms should be used for demonstration purposes. They believe that the work on such farms should be confined to experiment; as they state, obviously such farms cannot be expected to pay. These are views which have been accepted by the Mysore Government for the work of all our experimental farms.

The question of the utilization of seed farms for the purposes of demonstration which is discussed in this chapter does not at present concern us in Mysore as we have no such seed farms. It may be found advisable in the future to organize government seed farms more especially if the plant breeding work expands as it should. If that takes place I agree that the seed farms would form useful centres for demonstration.

The question of short courses for ryots on government farms is dealt with in a short paragraph and the practice of holding them is generally approved. I may say that such short courses have been held in the past both at Hebbal and on the Marthur Farm with results, in my opinion, hardly commensurate with the cost involved. In recent years all efforts have been concentrated on demonstrations in the villages and in connection with fairs and *jatras*. The question of reviving the short courses on some of our farms is under consideration.

With regard to the question of demonstration on ryots' plots the relative merits of carrying out such demonstrations by the departmental staff and of carrying them out through the agency of the ryots themselves are compared. The Commission conclude that while the former method is likely to lead to a more perfect demonstration, the adoption of the latter method is more calculated to leave a lasting impression on the individual. It is this consideration which has impelled us in Mysore to confine our efforts to the latter method.

Where the ryots themselves carry out the demonstrations under departmental supervision there is, of course, a very considerable danger of the supervision being slack with the result that the demonstration will largely fail in its purpose. We have been by no means free from this difficulty in Mysore. An increase in the staff of our agricultural inspectors and fieldmen will enable them to concentrate their efforts on smaller areas and this, together with more adequate supervision, should go far towards overcoming this real difficulty. Our goal in this direction should be an agricultural inspector and at least two fieldmen for each taluk and a supervising officer of the grade of assistant director for each district.

A feature of our experimental and demonstration work in Mysore which is, I believe, unique is the work of the Agricultural and Experimental Union. The members of the union agree to carry on in co-operation with the department fairly rigorous experimental work to test out new varieties of crops, new implements and new methods of cultivation and manuring. I believe that this type of work holds out very distinct promise for the future but it will have to be much more carefully fostered and supervised in the future than it has been in the past.

The holding of peripatetic demonstrations of improved implements and the utilization of *jatras*, fairs and shows for the holding of exhibitions and demonstrations, the importance of which is emphasized by the Commission, have been regular features of our propaganda work for many years. The fact that the *Dasara* Exhibition has now become an annual function, has necessitated the preparation of permanent exhibits which will be added to from year to year. Selections from these exhibits are being utilized in connection with district

shows and I anticipate a steady improvement in our work in connection with these shows in the future.

As to the question of the usefulness of publications I am inclined to agree with the views expressed by the Commission that unless the distribution of bulletins, circulars and leaflets is followed up or accompanied by actual demonstration work little good will be done. An exception can perhaps be made in the case of the Journal of the Agricultural and Experimental Union which is expected to reach the more intelligent and influential agriculturists of the State and to keep them in touch with the work of the department and with work elsewhere. I believe there is a place for a journal of this kind in the State and with the revival of the Kannada edition I expect it to prove of real value in our educative work.

Other specific forms of propaganda that are discussed in the Report are lectures, with or without lantern slides, cinema shows, demonstration trains and travelling lorries. Lectures and talks are of course given in abundance by the staff of the department. Lantern slides have up to the present been used but little. A large number of slides dealing with all phases of agricultural improvement are at present under preparation and will be available for use during the coming year. The question of preparing cinema films is also under investigation and proposals for an allotment for the purchase of the minimum equipment will be submitted in connection with the budget for the coming year. Discussion with an experienced agricultural officer who has had much experience in the preparation of agricultural films leads me to believe that they might prove a very useful form of propaganda.

As to demonstration trains and lorries I have to point out that the cost of fitting them out and keeping them in commission would be very considerable. Possibly an experiment might be tried with a demonstration train if the State Railway Department are prepared to co-operate. My feeling is, however, that the same amount of money spent on strengthening our district staff to allow for a more intensified propaganda in the villages would lead to much more lasting results. The demonstration train and the demonstration lorry are, I feel, much more likely to serve as rather spectacular propaganda among the non-agricultural classes than they are among the ryots in the villages. They represent a form of propaganda calculated to influence the vote

on an agricultural budget rather than to add to the agricultural wealth of the State.

The question of the utilization of local organizations to further the introduction of agricultural improvements receives detailed consideration at the hands of the Commission. They very rightly emphasize the fact that if an influential local body, whether it be an agricultural association, a district or taluk association or a co-operative society, is induced to take up agricultural improvements, the results are likely to be much more far reaching and to be attained at a much smaller expenditure of time and money than where demonstration work is done with individuals.

The well-known fact of the general failure of agricultural associations in India is recorded by the Commission and the equally well-known reasons are adduced. These reasons are : (a) the small direct interest which the members of such associations have had in practical agriculture, (b) the indefiniteness of the programmes of the associations and (c) the tendency to start too ambitiously with an association for a whole district.

The relation of the co-operative movement to agricultural propaganda is considered at some length. The general impression created from reading this section of the Report is that the attempt to utilize specially constituted co-operative societies for the dissemination of agricultural improvement has, on the whole, not been very successful. Exceptions mentioned are Co-operative Cotton Sale Societies of Bombay, the Co-operative Jute Sale Societies of Bengal, and the Societies for the Consolidation of Scattered Holdings and the Better Farming Societies of the Punjab. Reference to the work done through co-operative credit societies is slight but the Commission emphasize the importance of agricultural departments utilizing these societies in furthering improvement work.

It is, I consider, not my place to discuss here the success or failure of special agricultural co-operative societies in this State or the possibilities of development in this direction. That is, I believe, the duty of the Registrar of Co-operative Societies. I feel, however, that I must refer to the very promising work that has been started in connection with co-operative credit societies.

As is well known, thanks to the cordial relations which have existed in this State for many years between the Co-operative Department and the Agricultural Department, probably more striking progress has been made in this direction than in any other part of India. During the past year no less than 127 co-operative credit societies in the State were carrying on some form of agricultural propaganda. Recently arrangements have been made to hand over to two of the most progressive of these societies the whole work of the sale of implements, seeds and manures in the taluks in which they are situated. These societies are the Anekal Co-operative Society and the Goribidanur Co-operative Society.

In order to ensure a closer co-operation between the officers of the two departments an arrangement has been made whereby the local inspectors in a particular area are expected to devote the last week of each month to a combined tour with the definite object of developing agricultural work among the co-operative credit societies.

The most recent step taken has been the sanctioning in Government Order No. D. 6229-31 (C. Y. 144-27-6, dated the 14th December 1928 of the transfer of an experienced agricultural inspector to work in the Co-operative Department solely on problems connected with the development of agricultural co-operation.

The organization of village panchayets which represents the most recent attempt at rural development in Mysore opens up further possibilities of combined local effort towards agricultural improvement. It is still too early to say how effective these new agencies may become but it is interesting to note that already a considerable number of them have taken up some form of agricultural work. The commonest form is the purchase of improved ploughs for hiring out in the village and the purchase of artificial fertilizers in wholesale quantities for distribution among growers of such important crops as sugarcane and paddy. I anticipate also that the panchayets will perform most useful work in the organization and financing of campaigns against such insects as the *hamlihula* and the *jola* and the rice grasshopper, insects which can be brought under control only through the combined efforts of all the ryots in a village. An attempt will be made in this direction during the coming season.

As a recent experiment in the co-ordination of activities towards

agricultural improvement, the Commission pay particular attention to the recent development of Taluk Associations and Divisional Boards in Bombay. The following paragraphs quoted from the Report indicate the character of these bodies, their relation to the two main development departments associated with agriculture and the progress so far achieved.

“The taluka development associations in Bombay have been constituted under a Resolution issued by the Government of Bombay in 1922. As soon after the constitution of an association as possible, a survey of the taluka is to be carried out by the Agricultural and Co-operative departments. Where such associations exist, they have taken over the work formerly done in the taluka by agricultural associations, co-operative development committees and similar bodies. Membership of an association is open both to co-operative societies and to individuals who are willing to pay a small subscription. The associations are mainly deliberative bodies which meet two or three times a year to appoint office-bearers, sanction the budget and approve the programme of work. The execution of the programme is entrusted to the secretary and a small working committee of which two members are representatives of co-operative societies in the taluka. The main object of the associations is the demonstration of improved implements, improved seeds and manures. They do not, however, undertake the demonstration of any improvements unless they have already been successfully demonstrated on the cultivators' own fields by the staff of the Agricultural Department. They are not expected to undertake any large purchases and hiring out of implements or the extensive financing of the purchase and distribution of seed and manure, the intention being that they should merely advance development to such a stage that this can profitably be done by co-operative societies. If an association asks for them, the services of a fieldman are placed entirely at its disposal by the Agricultural Department, the cost being met from the funds of the association. The funds required for the work of the association are provided by a capital fund raised by annual subscriptions from co-operative societies, individuals and villages as a whole, and by an annual grant from Government which is equal to the income from other sources up to a limit of Rs. 1,000.

The taluka development associations work under the supervision

of divisional boards, of which there are six. Each of these boards consists of two official and four non-official members, of whom two represent the co-operative movement and two represent agriculture. The board is expected to meet at least once a quarter and to submit a report of its proceedings to the Director of Agriculture and the Registrar of Co-operative Societies jointly. One of the official members is ordinarily the chairman of the board. In addition to distributing the government grants allotted to the taluka associations on the principle described above, the board controls the distribution of the portion of the government grant for loans to co-operative societies which was formerly in charge of the Registrar of Co-operative Societies. The board also undertakes the distribution of the discretionary grant for propaganda purposes which was formerly administered by the Director of Agriculture. The board has also certain advisory functions. It is expected to advise local officers as to the way in which the policy laid down by Government or by the Director and the Registrar is to be carried out in its division. It is also expected to discuss questions of general importance and to bring to the notice of the department concerned such measures as it thinks should be taken for the economic advancement of the division.

The Government of Bombay have laid down that the propaganda work of the Agricultural Department should be carried on, as far as possible, through co-operative unions where these exist and, where they do not, through individual co-operative societies. The work of both agricultural and co-operative propaganda is distributed between the agricultural overseers working under the Agricultural Department and the agricultural organizers working under the Co-operative Department. It is intended that the charges of these officers should not overlap and that each should be responsible for both agricultural and co-operative work in his own area.

A report on the work of all the propaganda staff is submitted to the divisional board by the departments concerned every quarter and is forwarded to the Director of Agriculture and the Registrar of Co-operative Societies with the board's remarks. Any recommendations made by the board are considered and orders on them are issued by the Director and Registrar jointly.

There are now nearly sixty taluka development associations in Bombay started either on the initiative of the people of the taluka or

on that of the revenue officer in charge of it (the *mamladar*). The evidence we received showed that they were, on the whole, functioning successfully, though there have been some failures. We were informed that these have occurred mainly in the Konkan tract of the presidency in which a special class of landholders known as *khats* is to be found. The failure in this tract is attributed to the fact that, owing to the peculiar nature of the tenure and the excessive sub-division and fragmentation of land, neither the landholders, who are frequently absentees, nor the tenants take any great interest in the land.

The work of the taluka development associations and of the divisional boards in Bombay has been in progress too short a time to enable its effect in stimulating agricultural development to be gauged with any certainty. We have thought it useful to describe their organization and methods of working in some detail, not because we consider them suitable in every way for general acceptance, but because we are convinced that it is only by the adoption of this, or of some similar system, that the agricultural departments can effectively utilize the help of co-operative and other associations. The details of the organizations to be built up for this purpose must vary in different provinces. Much depends upon the efficiency of the agricultural and co-operative departments, much on the personality of the heads of the departments and their ability to work together, even more on the existence of a sufficient number of intelligent cultivators willing to form an active association. That closer association between the agricultural and co-operative departments for agricultural propaganda work is desirable, we have no doubt. The more elaborate course in rural economics, which we have suggested in Chapter XV for inclusion in the curriculum of the agricultural colleges, would include instruction in co-operative principles, whilst, amongst the short courses given at the colleges, would be one in rural economy for the staff of the co-operative departments. The instruction of agricultural officers in the principles of co-operation and of co-operative officers in rural economy should assist in bringing about closer touch between the two departments. But something more than this is required. It is essential that there should be a definite system of co-ordinating their work in the districts. It is our view, therefore, that the Bombay organization is well worth the study of other provincial governments. It is worthy of consideration whether the taluka should be the unit of organization or whether,

in some cases, a smaller area would not be a more appropriate unit. We would also suggest that Government might place at the disposal of the association the services of a more highly trained office than a fieldman. The Bombay organization might be held to be open to the criticism that too much depends upon official initiative and supervision but we think that reliance on such initiative and supervision is unavoidable in present conditions. In this connection, we wish to stress the part the district officer can play in advancing agricultural and other improvements in the area in his charge. His influence is such that any interest he displays in rural development is bound to be specially fruitful in results. Advantage of it is taken in some provinces, notably in the Central Provinces, by attaching an agricultural assistant to the camp of the district officer during his tours in the district. In Bombay, demonstrations of agricultural improvements by expert officers of the Agricultural Department have been given in conjunction with the annual settlement of revenue accounts (*jamabandi*) which is a feature of the revenue system in the *ryotwari* provinces of Bombay and Madras. We consider that both these methods of propaganda might be more widely adopted."

While these organizations represent a very interesting experiment towards the association of local bodies with the work of the agricultural and co-operative departments, the fact that they had been in operation only about five years when the Commission investigated their work indicates that they are still very much in the experimental stage.

The question remains as to how the various activities in a district can best be co-ordinated in Mysore. It would, I think, be out of the question to add another body such as the Divisional Board found in Bombay to the already rather complex district machinery. I would suggest the possibility of utilizing the economic committee of the district board for the purpose but consider that both the Agricultural Department and the Co-operative Department should be represented as a matter of course on that committee. The programme of work for the district as regards agricultural development could be drawn up by a small sub-committee consisting of the divisional agricultural officer, the divisional co-operative officer and the district economic superintendent. This programme which would consist mainly of items connected with the introduction of improved imple-

ments, seeds and manures could then be considered by the economic committee of the district board and forwarded with their comments to the heads of departments concerned. The funds voted by the district board for agricultural development might be used, at least in part, to supplement funds provided by co operative societies, village panchayets and other local organizations for carrying on demonstration and other work by them. These funds would, I consider, have to be supplemented by a special grant from Government of at least Rs. 1,000 per district in the first instance, which would have to be increased as work developed.

There is a real difficulty in the way of such a wholesale co-ordination of agricultural work in the district. This is the fact that at present the district boards have little, if anything, to do with the activities of the village panchayets. I cannot personally see how there can be a proper co-ordination of district activities without a change in the present arrangement in this regard.

I believe that in Mysore where the districts are comparatively small the functions of both taluk associations and divisional boards could be performed by the economic committee of the district board strengthened in the way I have suggested.

If a scheme somewhat on the lines of that proposed above is introduced it should lead to a concentration of demonstration and propaganda effort. The agricultural inspectors and their fieldmen while continuing to meet the needs of individual ryots would devote most of their attention to work with definite organizations and would thereby be able greatly to increase their effectiveness.

The Commission make a recommendation that a special propaganda officer of the rank of deputy director be attached to the office of the Director. It would be the duty of such an officer to keep himself informed of propaganda and demonstration work done elsewhere, to watch the various schemes of propaganda in operation, to record results and to make suggestions for increasing their effectiveness. He would also be the publicity officer of the department. I do not consider conditions in Mysore at present warrant the employment of such an officer and I should favour leaving the control of propaganda work in the hands of the divisional officers. As I have already indicated these will have to be increased and our goal should be one

supervising officer for each district and one agricultural inspector and two fieldmen for each taluk.

CHAPTER VII.

Animal Husbandry.

The chapter of the Report dealing with live-stock opens with a discussion of the numbers of domesticated animals in India and their relation to the human population. The following table gives the numbers of cattle and buffaloes and of sheep and goats in British India on the one hand and in the Mysore State on the other, according to the last census :—

	Total Number.	Number per 100 head of population.
<i>British India and Indian States.</i>		
Cattle and Buffaloes ..	151,000,000	61
Sheep and Goats ..	62,000,000	25
<i>Mysore State.</i>		
Cattle and Buffaloes ..	4,575,600	76.5
Sheep and Goats ..	4,235,400	70.8

The figures in the last column of the table indicate the proportion of these classes of live-stock to the total human population and show clearly the extent to which Mysore is a live-stock country. We have about one and a quarter times as many cattle and buffaloes and about three times as many sheep and goats, per head of population, as are to be found in British India. As a matter of fact, this does not give us a picture of the normal conditions in Mysore. Our figures for human population are taken from the census of 1921, those for cattle, sheep and goats from the census of 1925-26. This latter was taken after a series of years of severe fodder scarcity which led to a very heavy reduction in live-stock amounting, in the case of cattle and buffaloes, to fifteen per cent. If the cattle figures for 1921-22 are taken we find there were 90 head for every 100 of human population.

If we take certain individual provinces, such as Assam and the Central Provinces, we find the percentage of cattle per head of population is even higher than in Mysore but for quite a different reason. In these two provinces the cattle are notoriously poor in quality and

the ryots have to make up in numbers what they lack in quality. In Mysore, on the other hand, the quality of cattle is distinctly above the average and the larger numbers are mainly due to the fact that this State is a breeding centre from which are very largely supplied the neighbouring parts of Madras and Bombay Presidencies. I think we may safely assert that live-stock forms a more important element in Mysore agriculture than it does in the agriculture of any other part of India. This must not of course be taken as indicating that we are not overstocked with horned cattle, a question which will be discussed later.

Sheep are taken up first for consideration. An interesting account of attempts already made towards the improvement of sheep through the importation of foreign rams (chiefly Merino and to a lesser extent Romney Marsh) is given and the reasons for failure to obtain permanent results are indicated as mainly, (a) lack of organization with consequent lack of continuity in the work, (b) the desire to secure immediate results which besets the breeder in India, and (c) the utilization of unsuitable foundation stock in the form of ewes.

The history of attempts to improve sheep in Mysore illustrates the lack of continuity mentioned. The work of importing merino rams to improve the sheep of Mysore was started many years ago at the instance of Mr. Ricketts but, as far as one can gather, stopped with his retirement from service. The work was started again in 1914 at the instance and under the control of the Board of Agriculture and has been continued with more or less vigour ever since.

The work has consisted mainly of collecting and rearing the best ewes available from the local stock and crossing these with merino rams. This work is carried out chiefly on the Yellachihalli Sheep Farm. In addition, a small flock is kept on the Babbur Farm where cross breeds are interbred. It is hoped in this way to establish a new breed. The cross bred rams are distributed to selected rearers who agree to rear only white sheep. The district work has been confined mainly to the Kolar district where a Sheep Breeders' Association has been formed and a fair amount of progress has been attained. Two main difficulties have been encountered. In the first place, the merino rams, imported at considerable cost, succumb rapidly to our conditions so that they individually leave comparatively few progeny behind. This makes the work expensive. In the second place, it is not

easy to get good foundation stock in the shape of country ewes and these quite commonly, when covered by merino rams, give off coloured or poor lambs. The necessity of a sound foundation stock of country sheep is emphasized by the Commission and, I am inclined to think, it will be necessary to add to our work a station for breeding pure country sheep if we are to tackle the sheep question in a satisfactory manner. It should be possible to devote one of the Amrit Mahal *Kavals* to this purpose and, in fact, this matter is at present engaging my attention.

We are this year trying a new source for merino rams in an attempt to obtain more sturdy stock. I believe the work of distributing half bred rams should be continued but am opposed to any rapid expansion of this work, at present, as there seems to be evidence that cross bred stock, even the quarter breeds, are not as resistant to disease as are our country bred stock. I believe that in any case the work should be confined to selected tracts where the conditions are, for various reasons, most favourable. If work is concentrated in these tracts we may expect to achieve some tangible results whereas an expansion of the area would probably lead to no appreciable effect whatever. The possibility of developing a new breed of sheep combining many of the good qualities of the merino with those of our local sheep will also continue to engage our attention. Continuity in this work, the necessity of which is emphasized by the Royal Commission, is really fundamental to success. If the work already started were now to be discontinued, no results of any permanent value would remain.

The question of goat breeding is dismissed by the Commission in a single paragraph. I believe the subject warrants more consideration than this, at least in Mysore. In Mysore, the goats now form, according to the last census, about 40% of the sheep-goat population. The fact that they are much the hardier of the two animals is well known and is strikingly illustrated by the figures from the two last censuses, that of 1920-21 and that of 1925-26, which are given below :

			Sheep.	Goats.
1920-21	..	..	28,64,286	12,82,691
1925-26	..	..	24,92,269	17,43,122
Difference	..	<i>minus</i>	3,72,017	<i>plus</i> 4,60,431

As has already been stated, the census of 1925-26 was taken after a series of years of severe fodder scarcity. This, as shown, resulted in a reduction of the sheep population by about thirteen per cent or almost the same percentage reduction as took place in the case of cattle. On the other hand, the goat population increased by about thirty-six per cent during the five years. In fact, they form the only class of live-stock which did not show a decrease during the period.

While the possibility of crossing our local goats with the Angora for the production of hair is perhaps worthy of consideration, I believe the improvement of the goat from the standpoint of milk production is a more promising line of investigation. Goat's milk, while not relished by many, is undoubtedly very valuable, especially in the feeding of children; where the provision of milk for the young is in such an unsatisfactory state as it is in India the opening up of a source of supply available to the poorest is worthy of consideration. The importation of a few bucks of high milking strains (Saanen or Toggenburg) from Europe would, I believe, be well worth while.

The main portion of chapter VII is devoted to a consideration of the improvement of cattle and buffaloes. In their introductory discussion the Commission furnish an interesting table dealing with the distribution of cattle and buffaloes in the major provinces of India and in British India in 1924-25. I give this table on the next page adding to it corresponding information for the Mysore State.

It is interesting to compare, in this table, the percentage of cattle and buffaloes to population in Mysore with those in the neighbouring provinces of British India.

We have the following :—

				Percentage of cattle and buffaloes to population.
Mysore	..	..	..	76.0
Madras	..	..	..	52.2
Bombay (excluding Sind)	..		..	53.0

This might be supposed to indicate that our cattle are much less efficient than those in the neighbouring provinces. This is, however, not the case. As already indicated, a much more likely reason for the difference lies in the fact that Mysore is more largely a cattle-breeding country than either Bombay or Madras and the difference represents,

Distribution of Cattle and Buffaloes in the major provinces of India and in British India in 1924-25 as compared with that in Mysore in 1925-26.

Province.	Net area sown Acres (in 000's)	Total No. of cattle and buffaloes (in 000's)	Percentage of cattle and buffaloes to total population	Per 100 acres of net sown area			
				Estimated grazing land	Cattle	Buffaloes	Both
Assam	5,975	5,785	76.1	242	87	10	97
Bengal	23,528	25,491	54.6	33	104	4	108
Bihar and Orissa	25,269	20,728	61.0	56	69	13	82
Bombay { Presidency Proper	27,492	8,480	53.0	33	24	7	31
{ Sind	4,425	2,326	70.9	195	42	11	53
Burma	17,046	6,267	47.4	374	30	7	37
C. P. and Berar	24,895	11,671	83.9	107	39	8	47
Madras	33,339	22,111	52.2	79	49	17	66
Punjab	20,940	15,237	73.7	62	37	19	56
U. P.	35,121	31,046	68.4	52	64	24	88
British India including minor administrations ..	2,26,980	1,50,978	61.1	92	53	14	67
Mysore	6,385	4,575	76.5	67	62	12	74

largely, surplus which will be sold off to these two neighbouring provinces at the end of the year.

The general conclusion of the Commission is that considering the generally poor quality of the grazing, the number of cattle in this country is a heavy one for the land to carry. "If the cattle are to yield a profit which would be accepted as satisfactory in countries where cattle keeping is strictly economic, the bullocks would require to be fully employed, the cows to be of a heavy milking strain and the manure to be carefully conserved and returned to the land." As every one knows, this is nowhere in India the case and the inevitable conclusion is that many of our cattle do not pay their way. The Commission emphasizes the inefficiency of the Indian cow as a producer of young stock—a point which I emphasized many years ago and which has been dwelt upon by many other writers in India. There is a long discussion of the effect of soils and crops on cattle distribution and also an interesting comparison of cattle populations in Holland and in Egypt with that in India but this need hardly detain us.

The Commission also discuss the question as to whether a deterioration is at present taking place and conclude that the evidence they have accumulated points in that direction.

The Report emphasizes two points to be kept in mind on developing a policy for cattle improvement. The first of these is the reduction in the number of bullocks required for cultivation. This might be brought about by measures calculated to check the sub-division and fragmentation of holdings, and by those to increase the efficiency of tillage implements and those aiming at an increase in the strength of the bullocks themselves. The second is the necessity of providing more food and better treatment for dry cows and cows in calf.

In connection with the first of these the Commission give, in page 185, a table showing the number of different kinds of cattle kept per 100 acres of net area sown in certain districts of the United Provinces, the Central Provinces, Madras and the Punjab. These figures show the number of bullocks kept per 100 acres as varying from 5 in Bellary district (Madras) to 33 in Gorakpur district (United Provinces). The difference has, of course, to do very largely with the type of cultivation. Bellary contains large areas of cotton and jola which require no intensive cultivation while Gorakpur is a centre for sugarcane cultivation. They estimate, on the average, about 10 pairs of bullocks are

required for every hundred acres of net area sown in India. In Mysore, where there were approximately 6,15,000 pairs of bullocks in 1925-26 for a net area cropped of 6,164,568, we have almost exactly ten pairs for every hundred acres or 1 pair for every ten acres. The number varies in fact from one pair for every 7 acres (14 pairs per 100 acres) in the Hassan district to one pair for every 14 acres (7 pairs per 100 acres) in the Chitaldrug district. The estimated cost of maintaining a pair of bullocks for a year varies greatly but figures furnished to the Commission showed a cost which, spread over the area cultivated, would represent bullock cultivation charges varying from Rs. 7-7-0 to Rs. 14-9-0 per acre in the Punjab. Even the lower figure represents a heavy burden when we take into account the fact that human labour charges are not included. If we add to this, the burden of other cattle such as cows and young stock and buffaloes kept, we have a very serious burden on the land indeed. The effect of this overstocking on the treatment of cows is too well known to be enlarged upon here. It is sufficient to say that in a country where the cow is looked upon with veneration, it suffers more real cruelty than in probably any other country in the world.

The question of cattle improvement is intimately bound up with that of the supply of fodder and grazing. The Commission, therefore, devote much attention to this latter question. As to the improvement of grazing, while they realize its necessity, the only real suggestions they have to make are in connection with the possibility of instituting rotational grazing in forest areas and on public grazing lands and in connection with the utilization of surplus grass either as hay or ensilage in areas such as our *malnad* where rapid growth occurs only to be followed by prolonged drought. I may say in connection with rotational grazing in forest areas that the Chief Conservator of Forests has proposed the conducting of an experiment on these lines with an Amrit Mahal herd in the Chamarajanagar forests and that plans are now being made in this connection. As to the preservation of grass, the department has, for many years, been attempting to popularize the use of *malnad* grass for ensilage making and while the progress can hardly be said to have been startling, still a considerable amount of interest has been created. A scheme for the establishment of a Central Breeding Station referred to later, which will be submitted to Government probably before this note is finished, will involve the

making of hay and ensilage, in large quantities, on Amrit Mahal *kavals*, and this should give us valuable information as to the possibilities in this regard. The Commission lay stress on the possibilities of ensilage but as it is a subject which has been emphasized in Mysore and as continued efforts are being made towards its popularization no time will be devoted to it here.

Reference is also made to the possibility of popularizing the growth of green fodder crops, in the same way as green manure crops, in irrigated areas by supplying water free or at concession rates. I am personally doubtful if such concessions would lead to the desired result in Mysore but they might well be tried as an experimental measure.

A question which has not been touched upon by the Commission and which is of considerable importance in Mysore is that of the utilization of *gomal* lands. *Gomal* is included in the *Season and Crop Report* under other lands not available for cultivation of which the total area is nearly 7,000,000 acres. This area exceeds the total net area cropped in the State.

While it is not possible to state the area under *gomal*, I think we are safe in saying that over two million acres of the total given above is set aside for this purpose. The present utilization of the *gomal* lands is highly unsatisfactory. It is largely covered with shrubby growth and what grass actually grows upon it is so heavily overgrazed as to be of comparatively little value. The clearing of the *gomal* would in itself greatly increase the value of the grazing but where land is held in common this is out of the question. It is moreover doubtful if the increase in grass production would pay for the clearing. While much *goma* land is of such poor quality as to make its cultivation unprofitable under present conditions still there are, I believe, considerable areas which, if brought under cultivation, would give profitable yields of fodder crops. The question of utilizing *gomal* lands in this way has been discussed more than once. It has been very carefully considered by the Mysore Agricultural and Experimental Union who, at their annual meeting in 1921, have expressed themselves as follows :—

“ This meeting is of opinion that the present neglected state of *gomal* lands throughout Mysore is entirely due to the communal

nature of these lands, and the lack of individual interest in their improvement. They are further strongly of opinion that the existence of common grazing grounds is antagonistic to the proper breeding of cattle and the control of contagious cattle diseases."

"This meeting further resolves that *gomal* lands should be given over to individual cultivation on the condition that they should be used for the raising of fodder crops provided that the lands should not become the absolute property of the cultivator and should be inalienable. They further resolved that the extent that may be given to any one cultivator should bear a definite ratio to his arable land in the village."

While it is too much to expect that these resolutions will be carried out in full, I am strongly of opinion that steps should be taken early towards the better utilization of our *gomal* land. There can be little doubt that these lands could be readily brought to produce double the quantity of fodder they are now producing and it seems certain that this will be brought about only if the land is gradually handed over to individuals. I consider that in one village in each taluk, chosen for the extent and quality of its *gomal*, the experiment should be tried of handing over land in blocks up to five acres to private individuals on the understanding that the land be cleared and fodder crops grown thereon. The land could probably have to be given free for the first five years after which a rent would be charged payable into the village panchayet fund. I believe that, with sufficient interest on the part of the district officials and district boards, a very important advance in the direction of providing more adequate fodder supplies could be made in this way.

In considering the question of improving Indian cattle by breeding, the Commission point out that conditions in this country differ greatly from those in the West where the improvement of cattle is largely in the hands of private breeders. Unfortunately the number of these in India is small and the conditions of the live-stock industry are not such as to favour their increase. In fact, all the evidence goes to indicate that they are diminishing in numbers. It seems inevitable, therefore, that the foundation work must be carried out through government agency and on breeding farms supported by Government. In connection with this work two dangers are emphasized. The first is

the danger of providing conditions on breeding farms which will lead to breeding away from the hardiness so characteristic a feature of our cattle. Thus, for instance, it might be quite possible that were we to breed for higher milk yield and were we to feed our stock for milk production we should thereby be favouring the production of animals which would not be able to stand up well under the conditions at present existing in the villages. It may be some such thought as this which is in the minds of those who have expressed the view that were we to attempt to breed our Amrit Mahal cattle under domesticated conditions it would lead to a loss of the spirit which is so characteristic a feature of the breed. If instead of the word 'spirit' the word 'hardiness' were used there might, I think, be something to say for this view. In any case this danger will have to be kept in mind in the development of any cattle-breeding scheme in Mysore.

The second danger is that involved in the promiscuous and general distribution of bulls from government breeding farms. It is obvious that no government breeding scheme can hope to meet the need for breeding bulls. If, therefore, bulls which are bred under scientific control and at considerable expense by Government are distributed promiscuously, the permanent effect is likely to be small. Here, as in the case of the distribution of improved varieties of crops, there should be a concentration, in the first instance, in areas where facilities for keeping up the quality of the stock are present and it should be from these areas that general distribution should take place. This is a question which we shall have to consider very carefully in connection with the development of our work in Mysore.

The discussion of breeding work already being done in India, while interesting, has no particular bearing on our problems here. It is only in the Punjab, on the Hissar Farm, that work has been continued long enough to achieve any striking results and while that farm distributed 422 breeding bulls in 1925-26, a number which, I understand, has been considerably exceeded during the past year, it is to be doubted if they have any better foundation stock than we have in Mysore. As to the other provinces, they are but beginning and one of them, Bombay, has had to draw on Mysore for the foundation stock of one of its farms, that at Bankapur. One of the very few references to Mysore State in the Report is in regard to the Amrit Mahal herd and to cattle-breeding work here. The information contained in this

reference, I may say, is by no means entirely accurate. Reference is further made to the important role Mysore State plays in supplying draught cattle to both Bombay and Madras, a role which, I believe, will become less important in the future unless steps are taken immediately towards cattle improvement in this State.

Before discussing the problem of cattle improvement as it applies to Mysore it is necessary to refer to the question of cattle export upon which, I believe, the Commission express very sound views. They point out the well-known fact that no greater stimulus to cattle breeding can be found than a profitable export market and they are opposed to any export restriction on bulls and bullocks unless there is evidence that such export is likely to lead to the extinction of a valuable breed. As to the export of cows it should probably be prohibited if there is evidence of its taking place on anything like a large scale. As a matter of fact, there is, as far as I am aware, little, if any, evidence of the export of cows from Mysore and I should look upon any proposal to restrict export as one to be opposed most strenuously.

If we turn to the cattle-breeding problem as it confronts us in Mysore we have, as is admitted by the Royal Commission, a foundation stock in the Amrit Mahal herd which is second to none in India. I had recently an opportunity of showing about five hundred of these animals to Mr. W. Smith, Imperial Dairy Expert, an officer whose knowledge of Indian cattle in general is unrivalled. He told me that, in his opinion, we had material which, in value from a breeding standpoint, could not be duplicated in India, not even in the Punjab. When I state that during the past year only one bull was distributed from this herd for breeding purposes and not more than fifty, including those too young to serve, will be distributed during the present, it will, I think, be clear that we are wasting our opportunities. Moreover, the herd which now numbers about 6,000 head, the largest of its kind in India, is by no means as pure as it should be and I am very doubtful if we could muster more than 3,000 head which in conformation and colour could be looked upon as typical of the breed. The surprising thing is that the breed has retained its purity to the extent that it has when we consider the conditions that exist in the Amrit Mahal department.

The Amrit Mahal Superintendent has under him 6 *darogas* of whom one has had agricultural and live-stock training and another veterinary training. The rest have been promoted from clerical posts

in the Department and whatever knowledge they may have of cattle and of fodder and grazing must have come to them through the light of nature with what small amount of experience they may have gained. They do not even belong to communities which are accustomed to handle cattle and, with the exceptions mentioned, I doubt if any of them have ever done so.

These *darogas* have under their control 20 herds of the 300 head. These of a *servegar* and each herd numbering about 150 among cattle graze on an area amounting to 150,000 acres divided as *kavals*. In addition, they graze over a large area of forests extending. The *servegars* are paid Rs. 7 a month with perquisites the extent of which seems to be governed more by the degree of inherent honesty of the men than by any limit or control which could be exercised by the supervising officer even if they knew their business. Under conditions such as this it speaks much for the real ability and integrity of many of the *servegars* that the herds are in such pure condition as they are. I feel sure that the better men among them take a real pride in their herds and that the condition of graft which undoubtedly exists is more the result of custom than of any particular depravity on their part. In any scheme of breeding, the services of the better of these men should be utilized either in connection with the breeding operations conducted by Government or as subsidized private breeders for the multiplication of stock. They are among the very few people in the State who would have the ability to handle breeding operations on any thing like a large scale and their experience should be utilized to the full.

From the above account of present conditions it must be obvious that a concentration of breeding in one place which will allow for scientific supervision and the keeping of accurate records is the first step we must take. Such a concentration should take place in an area which experience has shown is best suited for cattle breeding. We are very fortunate in having valuable information on this point for the Amrit Mahal herds graze in *kavals* situated in almost every district of the State and different herds are more or less restricted to definite areas. It is an established fact that our best herds are those that graze in *kavals* of the Kadur, Chitaldrug and Shimoga districts for which Birur or Ajjampur may be considered as a centre. We know further that the soils in this area contain, in abundance, lime so essential

for the making of bone. While it is not the place here to go into the matter in detail I may say that proposals have been submitted to Government to establish a breeding station with headquarters on the Pārvatarayanakere *kaval* about one mile from Ajjampur. It is proposed to use this *kaval* comprising about 700 acres as a central farm for the keeping of cows in calf and young stock up to about one year. The dry stock is to be moved out on other *kavals*, in the neighbourhood of which there are available, with a total area of over twenty thousand acres. For the foundation stock of the breeding herd the best cows and bulls representative of the different types found in the Amrit Mahal herds will be selected. It is quite possible that we should add to these, animals from private herds in the established breeding areas of the State but that cannot be left over till we have organized the work with the Amrit Mahal stock itself.

Our chief difficulties in connection with this breeding work will be in connection with the staff. In no branch of agriculture is practical experience and skill so intimately wedded to scientific knowledge as in the breeding of live-stock and in no branch will mistakes be harder to correct and more disastrous in their consequences. In the breeding of crops, mistakes in selection become rapidly apparent and can be corrected without any very serious results. In the breeding of stock, it might easily be ten years before the evidence of a mistaken policy would come to light and it would probably take another ten years to correct such a mistake. It seems therefore essential that we should obtain the services of the best men we can for this work. If we make a failure in our live-stock improvement it will not be on account of unsatisfactory material but of an inadequate supply of properly trained officers.

The question of cattle breeding in relation to dairying is considered at some length. This subject is, I believe, one of only very secondary importance in this State at the present moment. We have as yet no great industrial cities in Mysore and while the supply of milk to our cities and towns is no doubt very inadequate there does not seem to be much scope for the establishment of dairies at the present moment.

The Commission suggest that the type of cow likely to suit the average cultivator would be one capable of rearing a strong calf and of

supplying in addition some 1,000 to 1,500 lbs. of milk per lactation for household use. Our Mysore cattle have the reputation of being about the poorest milkers of any cattle in India and it is to be feared that that reputation is justified. However, there are undoubtedly among them many cows which measure up to the above standard. The unfortunate thing is that outside of the Palace Dairy at Rayanaker and the Imperial Institute of Animal Husbandry and Dairying at Bangalore, no accurate records of milk yield are ever kept. In both of these dairies dependence for milk production is placed mainly on cross-bred stock or stock drawn from other parts of India. In the Palace Dairy there are a very few Mysore (Amrit Mahal) cows but they have never been kept in sufficient numbers to show what selected animals of this breed can produce in the way of milk. An important function of our cattle breeding station should be to keep a record of milk production of the cows used for breeding. If the poorer milkers are gradually weeded out and bulls which are the progeny of the higher yielders are distributed, it should lead to a gradual improvement in the milk yield of cows in the State.

Should the growth of our cities, more especially through the establishment of industries, improve the prospects of dairying in the State, the need will, I believe, have to be met by the introduction of animals with European blood. The work already carried out on the Palace Dairy shows that it is quite possible to build up a herd with four or five times the milking capacity of our local cows. I agree with the Commission in the view that the aims to improve the draught qualities should not be obscured by any attempt to produce a dual purpose—dairy and draught—animal and consider that the words of the following paragraph taken from the Report should be kept constantly in view in connection with our cattle breeding.

“As a general rule to be followed in the breeding of draught cattle, we are of opinion that milking qualities should be encouraged only in so far as these are entirely consistent with the maintenance of the essential qualities which good draught cattle should possess. The improvement of cattle is a slow and difficult business and the more definite the aim the greater are the chances of success.”

The paragraphs of the Report dealing with buffalo breeding and with milk production for cities are, I consider, not of sufficient importance to the Mysore State to warrant discussion here.

A paragraph is devoted to a consideration of co-operative breeding societies and as it is a subject which has already been raised in this State I feel I must refer to it. At the beginning I may say that I am in entire agreement with the following resolutions passed at the last Annual Meeting of the Mysore Agricultural and Experimental Union.

Resolution I.

“This meeting of the members of the Mysore Agricultural and Experimental Union recommends that the nucleus of an organization for the supply of breeding bulls be immediately formed.

In order that this object may be realized, the formation of a herd of Amrit Mahal cows and bulls of a standard type, selected from among the different Amrit Mahal herds, is very necessary.

This select herd should be kept under domestication, regular and faithful records of performance being maintained. A few selected bull calves owned by private breeders may also be included in the herd.

This meeting strongly recommends to Government the need for immediate provision of adequate funds in the budget of the Agricultural Department for the purpose of carrying out these proposals.”

Resolution II.

“Resolved that the organization of a Cattle Breeders’ Association be deferred till action has been taken on Resolution I.”

This latter resolution emphasizes the fact that there is no use attempting to take two steps in one. We have first to provide for and organize a supply of breeding bulls before we can organize any means for their distribution. However, we should also have our plans made beforehand so as to utilize the stock we shall produce to the best advantage of the State.

If immediate steps are taken to establish a breeding station utilizing the Amrit Mahal herds as foundation stock, it should be possible in the course of five years to be able to supply breeding bulls of good quality at the rate of at least 200 animals a year. Various suggestions have been made as to the best utilization of these animals. I have suggested above the possibility of utilizing the admitted practical knowledge of *servégars* and their families in cattle improvement and I believe that the better of these men, some of whom will probably

lose their present employment with the reorganization of the department, might, with advantage, be given facilities, in the way of land, for starting breeding operations on their own account. There will, I feel sure, also be a considerable demand for bulls from small breeders or influential landholders who desire to improve their cattle. There remains a consideration of the possibilities of combined effort towards cattle improvement. This could take the form (a) of the supply of a bull to a village under the control of the village panchayet to be placed in charge of one competent man, the cost of maintenance being met from the panchayet funds, or (b) of the supply of a bull to be allowed to roam the villages as a village *basava*. Either of the above arrangements would, I believe, necessitate an agreement upon the part of the villages to have all their scrub bulls castrated. In regard to the first of these alternatives it may at once be stated that the cost of maintenance of a breeding bull cannot be met from the covering fees which are commonly now charged and it would almost certainly involve a substantial subvention from either the Government or the district board to help towards the cost of maintenance. In regard to the second proposal, I may say it is strongly advocated by the Superintendent, Civil Veterinary Department. Casual reference is also made to it by the Royal Commission on page 237 of their Report. I am inclined to believe that it would not be generally popular; there would perhaps also be a danger of the bulls not being well looked after. However, the proposal merits a trial on a restricted scale in carefully selected villages.

Lastly, we come to the possibility of establishing Co-operative Cattle Breeding Societies. The Commission consider that where cultivators show a real interest in their live-stock, agree to dispose of their inferior cows, castrate their scrub bulls and provide grazing and fodder facilities sufficient to raise good animals, a bull should be lent or provided free by the department. I am inclined to agree that an attempt may be made in Mysore when bulls become available as a result of our breeding operations. However, in my opinion, the attempt should be made only after a very careful survey of the ground by a live-stock officer with special reference to the abovementioned essential conditions. The same conditions should, of course, govern the distribution of bulls to village panchayets.

A short paragraph in the Report is devoted to live-stock shows.

and the value of such shows especially in areas where intensive efforts are being made to improve the indigenous breeds. They consider that special attention should be given to show classes for cows, calves and yearling cattle.

The cattle shows in the Mysore State are almost invariably held in association with cattle fairs established to provide facilities for the purchase and sale of bulls and bullocks. Cows, calves and yearling stock are rarely brought to these fairs. In fact, these shows may be said to serve hardly at all in fostering an interest in cattle improvement except in so far as the attractive prices commonly paid for good stock tend to that end.

The committee appointed by the Mysore Government to go into the question of rules for the control of cattle shows and fairs, having in mind the more pressing important question of the control of contagious and infectious diseases, have hardly touched upon this question. I believe, however, that it is of sufficient importance to warrant the framing of general rules for the conduct of cattle shows as distinct from fairs. Mr. Davison, prior to his leaving the State, drafted a set of rules which might be used as a basis for discussion by the committee when it deals with the larger question of cattle improvement.

Only passing reference will be made to the remaining points in this interesting and important chapter. As already stated, the Commission are opposed to any restriction on the export of cattle except where there seems a danger of a valuable breed becoming extinct thereby. There does not, at present, seem to be any danger of that happening in Mysore. They do not consider the introduction of herd books would be of advantage at present. I may suggest, however, that when breeding societies are established it might be possible to introduce some system of herd book which, if associated with a tattooing of the progeny of the breeding bull on the ear, would enable a fairly accurate record of the progeny to be kept. As a matter of fact, it is proposed to make a beginning in this regard almost immediately in connection with the progeny of bulls standing for service on Government farms and at veterinary hospitals.

In connection with the castration of crub bulls, while the Commission consider that a campaign in favour of early castration is generally advisable still they think that the question of the effect of early castration on the subsequent development of the animal

requires investigation. This is an investigation which can be taken up satisfactorily only on a breeding station and will be kept in mind when the station is established.

The question as to whether live-stock improvement work should be carried on by the agricultural department or the civil veterinary department is one which is at present of only academic interest in Mysore as these departments are under one head. The Commission consider that, in general, the training of the agriculturist should render him better qualified to manage stock breeding farms than the training of a veterinary surgeon. This is a view which I hold although I also consider that if the agriculturist has in addition veterinary training he will make a much more valuable officer for the purpose. I may point out that a competent veterinary officer in the person of Lt. A. A. Monteiro is at present undergoing training in animal genetics and live-stock breeding at Edinburgh. On his return, he should be particularly well trained to take up this work.

As regards the more scientific questions connected with live-stock work, the Commission consider that the question of animal nutrition is so large as to require the co-operation of a number of workers in different institutions—a question that will have to be gone into more fully by the Council of Agriculture when it is formed. It seems to me that we shall not be able to tackle in Mysore anything more complicated than the usual feeding trials which are commonly conducted on cattle-breeding stations and which will undoubtedly yield information of considerable practical value.

As to the question of animal genetics, the Commission consider that, for the present, much useful spade work can be done by the recording of breeding observations on cattle farms and that the information so collected should form a valuable basis for future more strictly scientific work. Certainly observations on the breeding of such an outstanding breed as the Amrit Mahal would furnish information of very great value.

The further discussions in the chapter dealing, as they do, with the Institute of Animal Husbandry and Dairying in Bangalore and with the question of co-ordination of work in live-stock improvement by the Central Government hardly concern us in Mysore; so I shall not consider them.

CHAPTER VIII.

Forests.

The chapter of the Report dealing with forests confines itself mainly to the subject as it affects the agricultural population more especially in connection with the provision of fodder, fuel and timber and with the protection of soils from erosion.

At the beginning of the chapter is given a valuable table showing the proportion of the forest areas in the various provinces to their total areas. I give this table in somewhat modified form below including the corresponding figures for Mysore :—

Province.	Area of province. sq. miles.	Area of forest lands. sq. miles.	Percentage of forest area to total.
Assam	51,825	20,771	40.0
Bengal	76,755	10,529	13.7
Behar and Orissa	82,939	2,780	3.3
Bombay	123,125	12,292	10.0
Burma	243,207	123,746	67.7
Central Provinces	99,927	19,677	19.6
Madras	143,290	19,340	13.5
North-West Frontier Provinces	13,099	245	1.8
Punjab	97,281	6,695	6.8
United Provinces	106,720	5,228	4.8
Minor Administrations	61,720	3,637	5.9
Average for British India .. ..	....	....	20.4
Mysore	29,528	3,032	10.2

The figures for British India are for 1925-26 ; those for Mysore are taken from the *Season and Crop Report* for 1926-27. As will be seen, the percentage of forest lands to total area in Mysore is exactly half the average for British India (20.4%); it is almost exactly the same as that existing in Bombay and somewhat smaller than that in Madras. These figures seem to show quite conclusively that there has been no attempt in Mysore to extend forest areas at the expense of the agriculturist. As a matter of fact, as has been pointed out to me by the Chief Conservator of Forests, a large part of our forest area is situated

in inaccessible and sparsely populated areas. An examination of the figures given in Table II of the *Mysore Season and Crop Report* shows that under the heading "Other lands not available for cultivation", there is an area over three and a half times as large as that under forests. The figures for 1926-27 are as follows :—Area under forests 1,940,276 acres ; area under " Other lands not available for cultivation", 6,939,727 acres. This latter area is said to include, (a) land absolutely unfit for cultivation, (b) land reserved for pasture (*gomal* lands and *kavals* of sorts), (c) public *topes* and Government plantations, (d) land covered by buildings, roads, water, etc., or devoted to uses other than agriculture. It would seem highly probable that in Mysore the agricultural population would greatly benefit by the afforestation of considerable areas of land which are unfit for cultivation. I shall refer to this subject later.

The Commission refer with approval to the circular issued by the Government of India in 1894 laying down the general principles of forest policy. These principles may be stated very briefly as follows :—

(a) Restrictions of rights and privileges of user (*i.e.*, of the cultivator) should be exercised only where great advantage to the general public is to accrue and then only in so far as is necessary to secure that advantage ; (b) the claims of cultivation are, in general, stronger than the claims of forest preservation subject to certain reservations, *viz.*, (1) the honey-combing of valuable forest by patches of cultivation should not be allowed ; (2) it must be assured that cultivation will be permanent ; (3) cultivation should not be allowed to encroach on the minimum forest area required for the country and the local forest requirements present and prospective. These principles appear to be perfectly sound ones.

As regards the question of grazing and fodder, the Commission consider there would be advantage, from both an agricultural and a forest standpoint, in the cutting of grass for use in feeding cattle outside the forests over grazing in the forests themselves. They refer to an interesting experiment which is being carried out by the Forest Department in Bengal where grass cutting for stall feeding is being encouraged by the levy of a merely nominal fee for the cutting of fodder and by the provision of cattle sheds surrounded by fenced exercise paddocks.

It seems clear that the whole question of the utilization of fodder grasses in forest areas as also the utilization of village grazing areas requires very careful investigation. I refer elsewhere to the proposal by the Chief Conservator of Forests in Mysore for a co-operative experiment on rotational grazing in which the Forest Department and the Amrit Mahal Department are to be associated. This, if carried out, should furnish information of great value. I have also discussed the question of the better utilization of *gomal* lands, a question which, I consider, is of even greater importance from the fodder standpoint.

It seems equally clear that the better utilization of fodder cut on the forests must, for a long time to come, depend upon such demand as may be created in the neighbourhood of the forests. Experience during the fodder famine of 1923 and 1924 showed quite clearly that fodder can be transported over long distances and sold only at heavy loss and our experience in this regard has been similar to that of other parts of India. The storage of fodder in forests against periods of famine is an expensive business. The Bombay Forest Department are building up a reserve of 20,000 tons of hay by stacking about 4,500 tons per annum, the surplus being sold when the 20,000 tons have accumulated. They have found that, unless famine conditions prevail, there is a very poor demand for the surplus and it has to be sold at a loss of from Rs. 8 to Rs. 10 per ton. The 20,000 tons is estimated to be sufficient to save from 40,000 to 60,000 head of cattle where it is used to supplement existing resources which, after all, is a very small number where large areas are involved. There is also the danger of the loss of the stored fodder through fire, a by no means negligible contingency. The Commission express their conclusion on the question of famine supplies as follows :—

“As a general measure for famine relief, the storage of hay would be a practicable measure only if the demand in normal years were such that very much larger quantities of hay than are at present made in the forests could be marketed annually at places approximately covering the cost of production.”

As the Commission point out, if and when the live stock of the country is so improved as to warrant the purchase of fodder for its maintenance the difficulties in the way of utilizing cut grass will be removed but I fear that is a condition for which we shall have to wait many years.

The question of fuel supply to villages is especially important from an agricultural standpoint, for the wasteful practice of using cattle manure as fuel will disappear only if other fuel supplies become readily and cheaply available. It is a question that is quite as difficult as that of fodder supply, transport cost being here also a limiting factor. The only remedy is the establishment of fuel plantations with which could, of course, be combined plantations of trees the leaves of which can be advantageously used as fodder. In addition to the areas which are already included under forests of all kinds from which agriculturists are able to draw supplies of wood for fuel and other purposes, there are very large unproductive areas in the State which can be made of real use only through afforestation. Out of the area of nearly 7 million acres in Mysore which are classed under "Other lands not available for cultivation" there must, I believe, be at least 2 million acres which can never be used profitably for agricultural or even for purely grazing purposes. Such land should be gradually afforested. The effect of measures to this end on the agriculture of Mysore would undoubtedly be very great.

The importance of the establishment of fuel plantations has been recognized in Mysore for a very long time. Appendix H of the Land Revenue Rules of 1890 containing rules for the grant of waste and unoccupied lands for the planting of timber, fruit and fuel trees provides what must be looked upon as very liberal concessions to individuals who desire to establish fuel plantations. Apparently, these concessions have not led to results of any great value.

As long ago as 1916-17 the Agricultural Committee of the Economic Conference interested itself in the question of the formation of fodder and fuel plantations—a question that had been fully discussed at the Annual Meeting of the Economic Conference the previous year.

The Agricultural Committee prepared a scheme involving the establishment of forest nurseries in the following taluks most if not all of which are very poorly served as far as fuel supplies are concerned.

<i>District.</i>			<i>Taluk.</i>
Bangalore	..	..	Devanahalli.
			Hoskote.
Kolar	..	..	Sidlaghatta.
			Goribidnur.

<i>District.</i>			<i>Taluk.</i>
Mysore	..	..	Mysore. Krishnarajpet. Nagamangala.
Chitaldrug	..	..	Hiriyur. Chellakere.
Shimoga	..	..	Chennagiri.
Hassan	..	..	Chennarayapatna. Holenarasipur.
Tumkur	..	..	Sira. Madhugiri. Kunigal.

It was proposed, further, to place a sum of Rs. 7,500 at the disposal of the Forest Department for the formation of these nurseries and to utilize the services of the staff of both the Forest Department and the Agricultural Department in assisting ryots to start plantations under the rules mentioned above. As far as I am aware no action was taken on these proposals and the matter was allowed to drop.

Again in 1920, a special sub-committee of the Board of Agriculture considered practically the same question. This sub-committee was presided over by the Revenue Commissioner and had on its membership, among others, the Conservator of Forests. The proposals of the Agricultural Committee made in 1916-17 were apparently not referred to. The sub-committee devoted its attention mainly to a consideration of Appendix H of the Land Revenue Rules, with reference to the encouragement of both private and communal enterprise in the formation of fuel plantations.

The resolutions passed by the sub-committee recommended in the case of private enterprise :—(a) more liberal terms in the remission of assessment, (b) the granting of loans upto Rs. 20 per acre subject to a maximum of Rs. 200 and (c) wider publicity to the concessions. With regard to communal effort they recommended (a) a reduction in the minimum fixed for a village forest from 200 acres to 50 acres, (b) vesting of the control of village forests in the village panchayets where such have been formed, (c) vesting in the village panchayets the regulation of rights and privileges in respect of the removal of wood and

other forest produce and of grazing in village forest, *gomal* and district forest areas, and (d) vesting in the panchayets of rights to existing trees and *tangadi* and other minor forest produce where village forests are formed on land not already containing a large growth of reserved trees.

Here also no action appears to have been taken and the matter was again allowed to drop. In 1927-28 the question was once more considered by the Board of Agriculture again, as far as I can ascertain, without any reference to previous discussions and resolutions of that body. The resolution passed by the Board is as follows :—

With a view to improve village forests in the State the members of this Board recommend :—

(1) That in localities where sufficiently large tracts of forest land are available and where the Forest Department has already done some work, half a dozen village panchayets should be induced to start model village forests, each about 200 acres in extent, by offering a subsidy of Re. 1 per acre per annum towards the initial expenses for a period of three years.

(2) That a special forest officer should be appointed to draw up working schemes for these and other areas constituted as village forests and to render the necessary technical advice and help.

(3) That arbor days be instituted and weekly outings of school boys be arranged for planting up the blank and treeless areas of village forests.

(4) Village panchayets raising sandal trees on their forest be granted the usual bonus as in the case of individuals."

Government in passing orders on this Resolution have approved of the proposal to start model village forests as proposed by the Board of Agriculture and have ordered the inclusion of a sum of Rs. 1,000 in the budget of the Forest Department for the year 1928-29. Sections (b), (c) and (d) of the resolution are either vetoed or ignored in the Government Order.

The Report of the Revenue Commissioner on the working of village forests for 1926-27 indicates that appreciable progress in the establishment of village forests is being made only in the Mysore District. Even here only 11 forest panchayets out of a total of 53 are stated to have worked during the year. The record for the whole State is 44

working out of a total of 138. One is almost forced to the conclusion that lack of necessary supervision by officers who understand afforestation problems and who appreciate fully the importance of this work is what is largely responsible for the lack of progress.

It seems to me very doubtful whether the scheme of village forests and the inducements held out to individuals to grow fuel plantations will lead to a very rapid afforestation in regions where our agriculturists are most in need of wood for fuel and other purposes. The Chief Conservator of Forests whom I have consulted in the matter informs me that he considers the situation a serious one. I feel strongly that the work of afforestation must be carried out under the supervision of technically trained men if it is to have a decent chance of success. The suggestion made by the Commission that the work of developing forests which are grown mainly for the benefit of the villagers and not for the production of revenue should be under the control of a separate branch of the Forest Department which would deal with these forests alone, seems worthy of consideration. Such a forest branch could effectively supervise the work of village forests and fuel plantations developed under the land revenue rules. It could further take up the work of afforestation direct in areas where there seems no immediate prospect of the development of the above. That such afforestation may be made to pay its way is indicated by the following quotation from a letter received from the Chief Conservator of Forests: "From the few plantations that were raised between 1885 and 1895 and now under the control of the Forest Department it is seen that such plantations in Mysore, at any rate, are not likely to be a financial loss, although the initial cost of forming them may look rather high. The chief reason for this is the possibility of raising sandal in these plantations without seriously interfering with the yield of other forest produce." The importance of increasing our fuel, manurial and fodder supplies is so great that every method of attaining the object should be thoroughly explored.

The remainder of this chapter of the Report deals largely with administrative matters in the Forest Department itself, questions upon which I do not feel competent to express an opinion. One question is raised to which I must refer and that is the question of the relations between the Forest Department and the Agricultural Department.

The Commission state that the relations between the two departments are generally satisfactory and I should like to add that the relationship between the two departments in Mysore is of the most cordial and helpful character. They consider, however, that further advantage would result if forest officers underwent a definite course of instruction at an agricultural college. I am inclined to agree with this view but would suggest further that the training of agricultural officers could, with equal advantage, be enlarged and improved by a course in forestry. I would suggest that this question be kept in view in framing a curriculum for the Mysore Agricultural College when it is established.

CHAPTER IX.

Diseases of Live-Stock and their Control.

The scope of this chapter of the Report is indicated in the first paragraph as follows :—

“ We endeavour to show the harmful effect of cattle diseases on agricultural development ; we describe in some detail the character of rinderpest and the methods required to control it ; we discuss the meagre provision at present made for veterinary aid ; finally, we discuss the provision of superior and subordinate veterinary services and of scientific guidance for those engaged in combating disease.”

The Commission point out that the present imperfect reporting of cattle mortality in India makes it impossible to form even an approximately accurate estimate of the losses due to cattle diseases. As an example, the figures for cattle mortality from disease and natural causes in Burma between the years 1915 to 1924 when compared with the total number returned in the annual cattle censuses indicated an average life for Burmese cattle of 54 years, probably at least four times as long as the actual. This would indicate that in Burma only one death among cattle out of every four is ever reported.

The indications are that conditions are not very different in this State. About 50% of the villages do not submit cattle mortality statements regularly and at a very conservative estimate our losses from infectious diseases are double the number reported. Probably the losses are much greater than that.

The most serious infectious cattle disease is rinderpest not because of the very high mortality from it (there are several diseases

much more highly fatal) but because of its very wide spread and the ease of its transmission. About one-third of the chapter is devoted to a consideration of this disease and the methods for its control. The pioneer work by the Civil Veterinary Department of Mysore in the introduction of the serum-simultaneous method for the control of rinderpest receives very favourable comment and in fact is used as the main ground for the recommendation that this method should be introduced at once throughout India. I may point out that more recent results of inoculation work in this State appear to have confirmed fully the earlier conclusions as to the necessity of introducing this method of inoculation. As is no doubt known the old serum alone method of inoculation still practised in most parts of British India has been entirely abandoned in this State. It may safely be stated that the establishment of the Serum Institute and the exclusive use of the serum-simultaneous method of inoculation against rinderpest has given this State a leading position in work on the control of cattle diseases. I may point out in this connection that our production of serum from the institute this year is likely to be three times that of the previous year and that in addition to meeting all the requisitions of the Mysore Civil Veterinary Department it has supplied about a lakh of doses to the Madras Department. The production of rinderpest serum is now about one-third that of Mukhtesar, an institution which is supposed to supply the needs of the whole of India. I personally believe that with a strengthening of our veterinary staff to provide one inspector for each taluk and with some control of cattle movement we should be able to bring the losses from this disease down to a quite negligible figure.

In their consideration of the present meagre provision for veterinary aid and in their proposals to improve conditions in this regard the Commission make the recommendation that there should be built up two different veterinary services. Of these the superior should consist of fully trained veterinary surgeons who have undergone a course extending over at least five years. This superior service would be in the employ of the provincial government and would have the management of all measures connected with the control of epidemic diseases. The subordinate veterinary service would consist of veterinary assistant surgeons who have had a course of two or three years' training largely restricted to a study of cattle and their diseases and

who would be expected to deal with the ordinary ailments of cattle. These would be employed by local boards and would be in charge of the veterinary dispensaries and hospitals supported by those bodies. From them, however, would be selected a reserve which could be drawn upon in case of serious epidemics of cattle diseases with which the provincial officers could not cope. The Commission anticipate a very great but, of course, gradual increase in the staff of the veterinary services to about four times the present number.

The Commission recommend that one of the existing veterinary colleges be selected for the training of veterinary surgeons for the superior service and that the course should be lengthened to five years. At present, out of the five Veterinary Colleges in India one (that at Lahore) gives a four years' course while in the others the course extends over three years. I understand, however, that proposals have already been made to lengthen the course in some at least of the other colleges. The further proposal is made to retain the other veterinary colleges for the training of veterinary assistant surgeons for the subordinate service.

I am personally rather doubtful if provincial governments will be prepared to accept these proposals. It is much more likely that we shall see an extension of the course to four or five years in a number of the veterinary colleges with possibly the provision of a shorter course for veterinary assistant surgeons.

The interest which these proposals possess for us lies in the fact that we have to depend upon the veterinary colleges of British India for the training of our veterinary staff. We have in fact at present no less than 27 men with State scholarships who are undergoing this training. Practically all of these are being trained at the Lahore Veterinary College and so are receiving what is presumably the most thorough and extensive veterinary training at present available in India. We have no sharp distinction between superior and subordinate veterinary services as far as qualifications are concerned but if the Commission's proposals are accepted we shall have little choice in the matter unless we establish a veterinary college of our own.

It may be of interest to compare the veterinary cadre proposed by the Commission with that existing in Mysore at present.

If we leave out of account the staffing of the veterinary colleges, a provincial veterinary service would be made up as follows :—

1. Director of Veterinary Services as a selection post outside the cadre of the department.

2. Deputy directors, two or three in number in charges of circles into which the province will be divided. These would be selected from among the senior officers of the superior service.

3. District veterinary surgeons, members of the superior service and in provincial employ.

These officers would have control of all campaigns against contagious diseases and would at the same time have general supervision of the hospitals and dispensaries in the district.

4. Veterinary assistant surgeons to be employed by local boards in charge of hospitals and dispensaries supported by those bodies. From these would also be drawn a selected Veterinary Reserve Corps which could be used in the case of outbreaks of contagious diseases either inside or outside the district. The veterinary assistant surgeons would be on the same grade as the present subordinate veterinary service in British India. The scale in the Madras Presidency is at present Rs. 60-4/1-120, with selection grade of Rs. 125-5/1-175.

In Mysore we have, (1) Superintendent, Civil Veterinary Department, (2) assistant superintendents in charge of four circles, (3) veterinary inspectors of whom we finally expect to have one for each taluk with extra men as mobile corps and for such large hospitals as those in Bangalore and Mysore. As already stated, the qualifications are the same throughout.

While it is, no doubt, true that the introduction of such a scheme as the above would tend to cheapen considerably the provision of veterinary aid in this State, I do not think it feasible at present to introduce the proposed changes into Mysore even if it were desirable to do so. I am personally doubtful whether the training and ability required in the carrying out of inoculation campaigns against infectious diseases are so different from those required for conducting work in a hospital or dispensary as to warrant the distinction recommended. Inoculation campaigns are themselves carried out according to fairly well standardized methods and the success of an officer in such a campaign depends as much on his tact, initiative and common sense as upon his technical training. The presence of the three qualities mentioned is not likely to depend to any large extent upon the

thoroughness of the training in veterinary science that an officer has undergone.

Whether we follow the recommendations of the Commission or not, it seems certain that if we are to build up a really efficient veterinary service in the State we shall have to hold out to the staff better prospects than exists at present. A comparison of the scales of pay in Madras and in Mysore will show this.

If we leave out of account the officers in the Imperial Cadre who are on a grade of Rs. 350-50/1-650-1,250 with an efficiency bar at Rs. 650 followed by a selection grade of Rs. 1250-50/1-1500 after 20 years' service, we have the following scales in the neighbouring Madras Presidency :—

PROVINCIAL CADRE.

Rs. 200 for probationers on direct recruitment.

Rs. 250-25/1-550-750 with efficiency bar at Rs. 550.

SUBORDINATE CADRE.

Veterinary assistant surgeons Rs. 60-4/1-120.

Selection grade Rs. 125-5/1-175.

In Mysore we have the following cadre :—

1. Superintendent, Rs. 300-25-500.
2. Assistant superintendents, Rs. 150-10-200.
3. Veterinary inspectors, Rs. 60-5-120 with an efficiency bar at Rs. 120.

The grade for veterinary inspectors is a new one sanctioned in Government Order No. D. 9982-10044/C. V. 50-28-5, dated 30th March 1929.

A comparison of the grades for Madras and Mysore shows that our lower grade does not compare unfavourably with that in Madras. It is in the payment of our higher officers on whom falls the important responsibility of supervision that we fall so far short of Madras. While this note is perhaps hardly the place for proposals connected with the reorganization of the Civil Veterinary Department I feel constrained to point out that the lack of prospects in the higher grades of the department for men who have put in long and faithful service is certain to react unfavourably on the work in the department.

Finally, we have the consideration of research work in veterinary science. The Commission consider that the very excellent research

work at present being done at Mukhtesar should be continued and extended. They consider further that facilities be created for research work by the staffs of the various veterinary colleges should be continued and the members of the staffs of these colleges should, on this account, be transferred to executive work in the districts only under exceptional circumstances.

What can and should be done in this regard in Mysore ? Our Serum Institute is, at present, almost purely an institution for the production of rinderpest serum and virus. When its activities can be expanded it will be in the direction of the preparation of further sera and vaccines which are at present being imported from Mukhtesar or from outside India. While the preparation of these sera and vaccines may involve a certain amount of research they will in most cases be manufactured according to more or less standardized methods and the time of the staff will be taken up almost entirely on this work.

Two research posts have recently been created in the Civil Veterinary Department and the men appointed to these posts are being engaged in preliminary research work. Their laboratory work will, in the immediate future, have to be carried out in the laboratories of the Department of Agriculture—an arrangement which I consider unsatisfactory.

We should, I believe, not be warranted in the near future in developing a research institute purely for veterinary science in this State. However, if the proposals already submitted for the establishment of a combined Public Health and Serum and Vaccine Institute are approved, accommodation will be provided for these research officers as well as for an increase of the research staff when that is considered advisable. A close association of workers on human and animal diseases should enable a much more economical use of laboratory and library equipment than would otherwise be possible but it should do much more than this. If proper direction can be given, daily intercourse between workers on animal diseases and workers on human diseases should stimulate, greatly, research endeavour. I would urge most strongly that in the scheme for the establishment of such an institute adequate provision be made not only for the manufacture of the sera and vaccines now available for the control of animal diseases but also for research on the many animal diseases of this State about which at present little or nothing is known.

CHAPTER X.

Irrigation.

The Commission classify the irrigation problems of India under three main heads:—(a) the utilization of river waters without recourse to the construction of storage works either with or without the construction of weirs (anicut), (b) the management of delta waters, and (c) the construction of storage works, such as reservoirs, tanks, etc. To these must be added, (d) the problems connected with lift irrigation from wells and rivers. Of these only (a), (c) and (d) have any importance in Mysore.

The following three tables in which figures contained in the Report are combined with similar ones compiled for Mysore give most of the statistical information at present available connected with irrigation. The first table shows the development of irrigation since 1908-09 which indicates quite clearly that there has been a much greater percentage increase in irrigated area here than in British India (334. % against 11.2%) bringing the percentage of area irrigated to area sown up to about the same level whereas in 1908-09 it was decidedly lower.

TABLE I (BRITISH INDIA).

Year.	Gross area sown.	Percentage increase or decrease over 1908-09.	Gross area irrigated.	Percentage increase over 1908-09.	Percentage of area irrigated. to area sown.
	Acres (in 000's)		Acres (in 000's)		
1908-09 ..	240,189	..	45,681	..	18.6
1914-15 ..	280,641	5.9	50,644	10.9	19.4
1920-21 ..	239,202	-2.8	52,519	15.0	22.0
1924-25 ..	259,784	5.5	48,429	6.0	18.6
1925-26 ..	256,991	4.4	50,813	11.2	19.8

TABLE I (a) (MYSORE).

1908-09 ..	5,810,418	..	814,426	..	14.0
1914-15 ..	6,224,302	7.1	938,074	15.2	15.0
1920-21 ..	5,952,098	2.4	923,897	13.4	15.5
1924-25 ..	5,909,243	1.7	1,077,936	32.3	18.2
1925-26 ..	5,239,298	1.0	1,086,653	33.4	20.7
1926-27 ..	5,307,524	0.9	1,092,662	34.2	20.6

These figures do not give five-year averages but are those for selected individual years. The second table gives the average for the quinquennium 1921-22 to 1925-26 for the British Provinces and Mysore. If we compare our figures with those of the two provinces (Bombay and the Central Provinces) mainly situated on the South Indian Plateau, it would appear as if Mysore is particularly well placed as far as irrigation facilities are concerned. As a matter of fact, notwithstanding our rather unfavourable geographical situation from an irrigation standpoint the percentage of irrigated area to total net area cultivated is almost as high as the average for British India.

TABLE II.

Provinces.	Gross area sown. (in 000's)	Gross area of crops irrigated (from Government and private sources.) (in 000's)	Percen- tage of area irrigated to area sown.
		Acres.		Acres.
Assam	6,379	364	5.7
Bengal	27,777	1,710	6.2
Bihar and Orissa	31,021	5,386	17.4
Bombay { Proper	27,764	1,092	3.9
{ Sind	4,451	3,281	73.7
Burma	17,172	1,436	8.4
Central Provinces and Berar	26,726	1,110	4.2
Madras	37,691	11,208	29.7
N. W. F. Province	2,673	919	34.4
Punjab	30,970	13,644	44.1
United Provinces	43,739	9,630	22.0
Minor Administrations	807	156	19.3
Total	257,170	49,936	19.4
Mysore for 5 years, 1921-22 to 1925-26, Average	6,148	1,091	17.7

If, however, we study the third table which gives the areas under the different sources of irrigation we find that our conditions are not so favourable as would at first sight appear, for our areas under tanks and other unspecified sources of irrigation amount together to about 80% of our total irrigated area whereas in British India they amount to only about 25% of the total. While it is perhaps unsafe to attempt to assess the relative value of different sources of irrigation as they

occur in various parts of India, if we are to judge from Mysore conditions, I think we may safely say that canals generally give a much more assured supply of water than do tanks. The fact that the values of lands under channels are on the average much higher than those of land under tanks indicates this quite clearly. As to irrigation from other sources which, according to our published figures, account for one-third of our total irrigated area it seems to me doubtful if most of this should be classed as irrigation at all. Of the total of 356,000 acres said to be irrigated in this way about 280,000 acres are to be found in the three malnad districts: Hassan, Kadur and Shimoga. This area is really largely an area watered by the heavy monsoon rains supplemented by a small amount of additional water from streams and springs. The Commission state, " 'Other sources' have never been clearly defined but consist for the most part of temporary bunds for the storage of rainfall, of lift irrigation from rivers, and of channels from rivers and streams which are too small to be classed as canals." I think it is clear that this does not represent the situation as regards Mysore and that if we were to include only areas irrigated from such sources as those mentioned, our area under 'Other Sources' would be greatly diminished.

TABLE III.

Provinces.	Canals. Acres (in 000's)	Wells. Acres (in 000's)	Tanks. Acres (in 000's)	Other sources. Acres (in 000's)	Total. Acres (in 000's)
Assam	191	..	1	172	364
Bengal	289	32	615	557	1,493
Bihar and Orissa ..	1,812	628	1,709	1,205	5,354
Bombay { Proper ..	290	531	109	38	968
{ Sind ..	2,930	43	1	127	3,101
Burma	889	18	195	299	1,401
Central Provinces and Berar	946	117	....	46	1,109
Madras	3,803	1,654	3,362	467	9,286
N. W. F. Province ..	769	89	....	57	915
Punjab	9,836	3,385	15	120	13,356
United Provinces ..	2,080	4,737	65	2,317	9,199
Minor Administrations	28	88	28	....	144
Total	23,863	11,322	6,100	5,405	46,690
Percentage of total ..	51.1	24.2	13.1	11.6	....
Mysore	132	84	501	358	1,073
Percentage of total ..	12.2	7.8	46.7	33.2	....

I shall not attempt to discuss fully this chapter as much of it is devoted to matters of no real interest to Mysore or matters upon which I am not qualified to speak. The account of the large schemes of irrigation which are either already being developed or are under active consideration in other parts of India must impress all those interested in agricultural development with the importance of a consistent programme of development of our irrigation possibilities more especially with reference to canal irrigation.

The Commission discuss the distribution of water and point out the well-known heavy waste that takes place in connection with flow irrigation. In the north of India, where wheat is being irrigated, this wastage has been estimated at between 30% and 50%. This they consider, as due not only to the extravagance of the ryots in the use of flow irrigation water but also partly to the uncertainty of supplies for subsequent irrigations. In the case of well irrigation the ryot has the supply under his own control; in the case of tanks and channels he has not. As is well known, the wastage of water is not the only evil attending excessive irrigation; deterioration of the soil also frequently results. The Commission consider that, notwithstanding the view of the Irrigation Commission to the contrary, the system of sale of water by volume is worthy of further investigation. They refer to the use of meters and modules in the distribution of water from canals in the Punjab and note that their introduction has led to a more economical use of water.

In connection with the actual distribution of water, the Commission consider that the only agency other than that of Government which can be satisfactorily developed is that of the irrigation panchayet for controlling distribution to the actual fields but they also realize that the development of these panchayets is bound to be slow.

In connection with the question of minor works, the Commission consider especially the question of tank building and restoration. Considering the fact that almost fifty per cent of our irrigated land receives its supply from tanks, this question has in Mysore an importance beyond that in any other part of India. I realize that this is at present receiving most active attention from the authorities concerned and it is quite beyond my province to say anything on the subject. However, many of our tanks, even if restored and improved as far as economically feasible, are bound to remain very uncertain sources

of irrigation. The question of supplementing the supply of water in them through the construction of wells below the bunds, although it has been discussed time and again, has received very little attention.

The question of well irrigation is discussed under the heading of (a) irrigation from tube wells and (b) irrigation from ordinary wells.

It must be obvious to anyone that the conditions for well irrigation are much less favourable in Mysore than they are in most other parts of India. The statistics given in Table III above show this quite clearly. The average percentage of irrigated land under well irrigation in British India is 24.2. The percentage for Mysore is 7.8. If we consider the most favourably situated province, *viz.*, the United Provinces, we find it has 51.5% of its total irrigated area under wells.

Much attention is devoted in the Report to tube wells, a subject which, while worthy of investigation in this State, is hardly likely to be an important one with us. When we learn that, in the United Provinces where conditions are obviously much more favourable to the sinking of these wells than in Mysore, irrigation from them is profitable only when the most profitable crops are grown, the chances for their success from an irrigation standpoint in this State do not appear bright. Where it is a question of village water supplies it is, of course, another matter.

As regards well irrigation in general there is not the slightest doubt that the construction of more irrigation wells, more especially in connection with our tanks, is a question of outstanding importance. It is, moreover, a question that is at present being largely neglected in this State. As is well known, a very large number of our tanks hold but a precarious supply of water which frequently proves insufficient for the maturing of the single crop sown under them. Very frequently a satisfactory, if not abundant, supply of water can be obtained by sinking wells below the tank and in some areas, more especially in the Kolar district, the existence of this form of subsidiary irrigation is quite frequent. In many of the other districts, however, such wells are very rare indeed.

The presence of a number of subsidiary wells below tanks where the supply of irrigation water is uncertain would allow for a considerable extension of such valuable crops as sugarcane and would, to a very large extent, save crops which are now lost owing to the lack of water for one or two irrigations before maturity.

About six years ago I was requested by Government to investigate the question of an organization for assisting the agriculturists in the sinking of wells in Mysore. I found that the chief difficulties which the ryot has to confront are the following :--

The first is the question of finance. It is true that takkavi loans are available for well sinking and, in fact, they were at that particular time being granted very freely. However, the difficulty frequently arose that the ryot had no means of judging with anything like accuracy just what the well which he proposed to sink might cost him. This was owing to the fact that he had no way of testing the character of the strata through which the well would have to be sunk. He, therefore, frequently found that the loan he had obtained enabled him to do only about half the work required for the construction of a profitable well. He then either became discouraged and abandoned the work or if he sought a second loan to complete it the money became available too late, for the original excavation had collapsed owing to the rise of the water table during the rains. The amount of time and money that has been wasted in Mysore in well excavation of the kind described has undoubtedly been very great and most of this might have been saved.

The second difficulty experienced is in sinking the wells sufficiently deep to assure a reasonable supply of water in dry seasons. A very large number of the wells in this State are from 10 to 20 feet too shallow with the result that they fail when they are most needed. Once they are dug and revetted there is practically no possibility of deepening them ; so they remain of very little real use to the owner. There is, of course, the possibility of improving them by sinking a bore hole at the bottom and exploding a charge of dynamite in the bore hole. This possibility has been as yet hardly at all explored in Mysore but it is to be doubted if it would, in most cases, be a satisfactory substitute for deepening the well.

The difficulty in sinking wells deep enough lies in the fact that unless they happen to be sunk during a very dry season, the water enters the well more rapidly than it can be baled out, the sides tend to collapse and the ryot fearing the entire loss of his work proceeds to revet the sides for the well before he has obtained an adequate supply of water. Provision of adequate appliances for removing water

during the process of deepening and expert advice on the use of curbs is what is required under these circumstances.

Six years ago plans were made for the organization of a well sinking section in the Agricultural Department and estimates for an expenditure of Rs. 33,790 non-recurring and Rs. 14,542 recurring were submitted. The actual total allotment for this purpose was Rs. 25,000. While this was quite inadequate still it did enable a beginning to be made and certain quite valuable information to be collected.

In the first place it became clear that with an experienced staff it would be possible after preliminary boring in a neighbourhood, which could be done at small expense, to estimate with considerable accuracy how deep it would be necessary to go to obtain an adequate supply of water, what difficulties would be encountered in the process of well sinking and what a well of given dimensions would cost. This would provide information of the greatest value to those who wished to sink wells and would, in the course of time, furnish a body of information as to our underground water supplies which would be of immense value for future developments.

Along with this I attempted to work out a scheme for the co-operation of the Revenue Department with the Agricultural Department in the granting of takkavi loans. According to this scheme takkavi loans would be sanctioned only after an investigation on the spot by an officer of the well sinking section of the department. Further, to ensure a proper utilization of the loan it would be paid in instalments each instalment after the first being paid on a certificate by the well section that the previous instalment had been properly utilized. I may say that I had no expectation of being able to extend the activities of this well section to all parts of the State even had my original estimates been sanctioned. I felt that in work of this kind it would be necessary to move cautiously and to build on the solid foundation of observations made. In fact, the work was, during my presence in the State, practically confined to two taluks of the Kolar district. Shortly after my departure from the State the whole equipment and staff were transferred to the Industries and Commerce Department where it has, I understand, since been very advantageously utilized in work towards the supply of drinking water to towns

and villages. While I do not wish to appear to criticize, I must confess that the abandonment of this work with the consequent waste of all information obtained was a bitter disappointment to me. We are now no farther ahead than we were in 1923 and the money spent at that time has, of course, been very largely wasted. My own conviction is that this important work can be satisfactorily carried out only if a definite engineering section of the Agricultural Department is created to deal with it. I further believe that the proposals made by me six years ago represent the minimum required for starting the work.

In connection with the development of "Other Sources of Irrigation" the Commission draw attention to the possibilities of extending irrigation from small streams by means of power-driven pumps placed on the banks or on temporary stages or floats where the permanent bank is at some distance from the water lift. Irrigation from our streams and rivers has been attempted in quite a number of places in Mysore but, I believe, has not been generally successful owing no doubt largely to the great variation in the water level and the height to which water has to be lifted in the dry season. I am inclined to believe, however, that there is considerable scope for this kind of irrigation in Mysore more especially where electric motors can be installed as motive power.

The Commission raise the question of the relations between the Agricultural and Irrigation Departments. In Mysore we have at present four departments concerned with the provision of irrigation facilities, the Public Works Department, the Revenue Department, which have to do with the control of flow irrigation works and the Department of Industries and Commerce and the Electric Department which have to do with installations for lift irrigation. Of these the only one which is in touch with the Agricultural Department is the Department of Industries and Commerce. Before the Director of Industries and Commerce passes orders on an application for water lifting machinery under the hire purchase system he obtains from the Director of Agriculture a report on the feasibility of the scheme from an agricultural standpoint. This arrangement has, I believe, worked very satisfactorily and I consider it could, with profit, be extended to schemes for electrically driven pumping installations as well. The

arrangement serves two useful purposes. In the first place, it gives some assurance that the water lifted can be profitably used. In the second place, it enables the Agricultural Department to get into touch with the owners of the installations and so to advise them regularly as to the most profitable method of utilizing what must after all be fairly expensive irrigation water.

As to the development of new irrigation schemes by the Department of Public Works I have to point out that in no case since my arrival in Mysore has there been any attempt to have an agricultural survey made of the area it was proposed to irrigate by agricultural officers. The Public Works Department have acted on the formerly accepted view that an irrigation engineer is quite capable of dealing with this matter. This view has, I believe, been generally abandoned in British India but is apparently still retained in Mysore. I believe this is a question for very serious consideration.

If we take as an example the Irwin Canal which is expected to bring about 120,000 acres under irrigation the money which is being invested in the project and the very important implications for the future of Mysore agriculture would seem to have demanded the association of the Agricultural Department in the work from start to finish. Up to the present there has been practically no association. I feel very strongly that this association should be established without further delay. It seems certain that if this very important project is to be the success it should be, it will be necessary to establish an experiment station for research on the most economical and profitable utilization of the water from the standpoint of the amount of water used, the kinds of crops to be grown and the methods of cultivation and manuring to be practised. Facilities should be provided on this station for a study of the water requirements of crops and of the most satisfactory methods of measuring water supply such as has not been possible up to the present. Information as to the duty of water for important crops in Mysore is hopelessly inadequate—in fact it is practically non-existent and this state of affairs should be remedied as rapidly as possible. A close association between the irrigation division of the Public Works Department and the Agricultural Department in this work seems absolutely essential. In this connection I may draw attention to remarks on pages 356 and 357 of the Report where it is recommended that definite conditions be laid down as

regards the holding of land and the type of crops to be grown under new large irrigation works. In the case of the Irwin Canal area most of the land is, I believe, already under occupancy so the only control Government could exercise would be that connected with the supply of water. This can, I believe, be made a very effective instrument towards the development of a greatly improved type of agriculture in the area.

One of the main recommendations of the Commission in this chapter has to do with the proposed formation of a Central Bureau of Information on irrigation questions which would collect information on these questions from all parts of India and elsewhere and would disseminate. This bureau would undoubtedly serve a useful purpose not only for the provinces of British India but for Indian States as well.

CHAPTER XI.

Communications and Marketing.

The question of means of communication in the form of railways, waterways and roads is discussed at considerable length in this chapter. The importance of communications to the agriculturist is so fully recognized in Mysore and the question of their improvement is so constantly kept in view that it seems unnecessary for me to discuss it here. I shall, therefore, confine my remarks to questions relating to the marketing of agricultural produce.

In the first instance it may be noted that while the general facts in regard to the marketing of agricultural produce are known, no exhaustive study has ever been made. The agricultural departments who might properly be expected to carry out this work have, up to the present, had neither the staff nor the funds to enable them to conduct such an enquiry.

One of the most valuable suggestions made in this chapter is for the carrying out of market surveys. As the Commission's recommendations in this regard seem to be particularly valuable I quote the paragraph dealing with this subject *in extenso*.

MARKET SURVEYS.

“We have sought to make plain the extent to which the prosperity of the cultivator and his progress in agricultural efficiency

depend upon sound marketing. It has been pointed out that comparatively little has been done by Government in India to assist the cultivator in his marketing operations. The collection and study of exact information on the question must necessarily precede the formulation of an effective policy for the improvement of marketing. Guesses and hearsay cannot provide the grounds for action, and, at present, the departments of agriculture are without much of the material essential for a forward move. We think the provincial departments should at once begin a study of marketing conditions. The expenses of the work should not prove unduly heavy, and we are satisfied that any funds disbursed will be amply repaid. But if such surveys are to be of value, the personnel engaged upon them must be suitably equipped and the plan of investigation both businesslike and thorough. The investigator should combine a sound knowledge of economic theory with a practical acquaintance with the conditions of production and sale of the commodity with which he is concerned. He must be prepared to develop his conclusions in accord with facts as these are established by him and must eschew the temptation to mould and colour 'facts' to suit prepossessions. He should usually concentrate his attention upon one class of produce at a time, though a group of commodities handled throughout the length of the marketing chain by one set of intermediaries may sometimes be conveniently included in a single survey. A survey of production, of internal consumption and of the export trade, where this exists, will form an essential preliminary to the proper understanding of the existing situation. The extent to which production is localized and, in some instances, to which it is seasonal will demand the investigator's attention. In India, he will not, save in exceptional cases such as that of white sugar, be called upon to consider how far and in what circumstances imports compete with the home product. Where reliable and continuous statements of prices exist, he should examine the movement of prices over a period of years and the extent to which seasonal fluctuations appear and to which prices differ between one locality and another. He will attempt to analyse the whole price structure and, as far as possible, to measure the margin attributable to the various functionaries concerned. He must have himself closely acquainted with the factors which influence both the quality and quantity of supplies. The relation between the producing and consuming centres and the state of communications

will come within his purview and he will need to understand the methods by which crop forecasts and crop estimates are made. He will then turn to the conditions of demand and obtain a general appreciation of what is demanded in terms of both quality and quantity. Here again, an examination of seasonal fluctuations and local differences will be required. It will not be sufficient to enquire into the nature of the demand unless the extent to which it is met by supplies at remunerative prices is also taken into consideration. A critical examination of the marketing machinery will then follow and the investigator will examine the efficiency of the markets, their physical conditions, their administration and the facilities they offer. At this stage, close attention should be given to the relation of the cultivator to his primary market, including the influence of debt upon his freedom of choice as to where and when he will dispose of his produce, the extent to which produce is sold to village traders and marketed by them and the tolls and taxes on the cart of the value of its contents which are levied by the municipal or other local authority. The extent to which a comparison of prices generally between market and market can be taken as a reliable index of market conditions is another point to which attention must be paid. The technical study of storage methods and facilities will lie outside the province of the investigator: on the other hand, the study of the amount of storage available, the cost of storage and the margin available for their recoupment, as well as the consideration of the most suitable place at which to store, are integral parts of a marketing investigation. In the penultimate stage of his enquiries, the investigator will trace the channels through which the commodity passes in its journey from the producer to the consumer. He will study the various types of middlemen and endeavour to appraise the services rendered by each. As far as data are available, he will examine the costs of distribution under different conditions. Finally, the investigator will study the position of the co-operative movement and the extent to which savings in distribution costs can be secured by co-operative sale. At the conclusion of an investigation carried out on these lines, he will consider the existing system of market intelligence and the methods by which the utilization of such intelligence can best be extended. He will need help in carrying out his enquiries as they will extend to the villages as well as to the marketing centres

and it will not, therefore, be possible for the whole investigation to be carried out by one individual. The qualifications required in such staff as may be given him are of a somewhat different order from those which it is essential that the investigator himself should possess. They must be men with rural outlook and knowledge who can gain the confidence of the cultivator and obtain answers to the detailed questions framed in the enquiry. We need not emphasize the importance of keeping accurate records of all information collected, of the planning of the surveys and the precise methods employed in obtaining the information."

The Commission further recommend that a special expert marketing officer of the grade of a Deputy Director be attached to the Agricultural Department in each of the major provinces.

Most of the accurate information in connection with markets in India is that which has been collected during investigations on the marketing of cotton by the Indian Central Cotton Committee. The evidence collected by this body and by other organizations have shown quite clearly that the development of properly organized and controlled markets would be of very great advantage to the agriculturist as even under present conditions he, almost invariably, gains by selling his produce in a market rather than in his own village.

Some of the requisites for a satisfactorily organized market are the following: (a) adequate accommodation including storage accommodation to enable sellers to store their produce temporarily to protect them against the forcing down of price by the buyers. This storage accommodation can, it is believed, be furnished most satisfactorily by co-operative agency; (b) a control and inspection of weights and measures which will ensure accuracy and uniformity; (c) an arrangement for the daily posting in the market of prices, more especially those at the ports in case of produce such as cotton and wheat the price of which is governed largely by world prices; and (d) a regulation of the brokerage and other fees which may be charged to the seller as also a regulation to prevent brokers acting at the same time on behalf of buyer and seller.

The Commission express the opinion that the establishment of organized and controlled markets to meet the needs mentioned above is an essential feature of a programme for agricultural development. Attempts to organize such markets have been made under the Cotton

and Grain Markets Law operative in Berar as also under the recent Bombay Markets Act. The following account of the operation of the former and of the improvements which the latter seeks to introduce is taken from the Report :—

“ Although the law under which the Berar markets have been constituted is known as the ‘ Cotton and Grain Markets Law ’, the markets are in actual practice used almost exclusively for cotton. Under the provisions of the law, markets and bazaars may be notified and committees may be appointed to manage them. Rules may be made to regulate the constitution and powers of the managing committees, the levy, collection and disposal of fees, the conditions under which licenses may be issued to brokers, weighmen and measurers, the places for weighment and measuring, the scales, weights and measures to be used and their inspection, verification and correction, and so on. Unauthorized markets and bazaars may be prohibited. Detailed rules on these points were promulgated in a notification issued in 1898.

The main criticism which has been brought against the Berar system is that the market committees are unwilling to take energetic action to secure fair trading owing to the fact that the majority of their members are general commission agents or large buyers who do not wish to offend the class to which they belong or on which they are very closely dependent for a successful season’s trade. This defect is inherent in the constitution of the committee as the rules lay down that no person is eligible for appointment to the committee who has not resided within the limits or within five miles from the limits of the town in which the market is situated for at least three months prior to the date on which the list of persons eligible for appointment to the committee is prepared. This means in practice that members of the cultivating classes in the area served by the market are excluded from the committee and that their very substantial interests in the proper management of the market receive no recognition. The Bombay legislation seeks to remove their disabilities in this respect by providing that they shall elect not less than half the members of the market committee, of whom there will be not less than twelve or more than sixteen. Of the remainder, one will be a member nominated by the local Government, one will be elected by the district local board of the district in which the market is situated, one by the municipality,

if it is located within municipal limits, and the others by the traders in the market. The Bombay legislation provides that no trade allowance other than an allowance prescribed by rules or by laws made under it shall be made or received by any person in any transaction in the market. This is an advance on the Berar legislation which, although it forbids the taking of trade allowances, does not define them. Both laws provide that the market committee may employ such officers and servants as may be necessary for the management of the market. This is an important provision in view of the complaints which have been made of the manner in which the cultivator is cheated in the matter of weighment. The Bombay legislation, as does that of Berar, prohibits the establishment of unauthorized markets within a prescribed distance of markets established by law. Under the Berar law, any surplus of market funds remaining at the end of the financial year is automatically transferred to the district board or municipal committee in whose area the market is situated. Under the Bombay legislation, it can be expended only on certain purposes connected with the market which are defined in the Act."

It is pointed out that the Berar markets are confined almost exclusively to cotton and the Bombay Act definitely limits them to that product. The Commission feel, however, that the difficulties under which agriculturists suffer in the marketing of their produce are not confined to cotton and that regulated markets are so advantageous to the general public including both purchaser and seller that they should be extended to agricultural products other than cotton. Questions in connection with the organization of markets such as the necessity for legislation, the relation between local authorities and markets, the constitution of market committees and the management of markets need hardly be considered at present while other questions such as the quality of Indian products as affecting their prices and to practices of adulteration, mixing and damping are ones which are so difficult as to seem almost impossible of solution in the near future.

There are two special aspects of marketing which are, I believe, of considerable interest to us in Mysore. There are co-operative sales and auction sales, action in connection with both of which has been confined entirely to cotton. Auction sales have been conducted by the agricultural departments in the Punjab and Bombay in connection with the introduction of new varieties of cotton so as to ensure

to the growers a return for their product which otherwise they would have been unable to obtain. In both cases these auctions contributed very materially to the rapid introduction of the new varieties. As soon as the improved cotton varieties had been established on a sufficient area to enable them to gain a name in the cotton trade, auction sales were discontinued in the Punjab while in Bombay the work was taken over by co-operative societies.

It remains now to consider the situation in Mysore and the recommendations of the Commission in relation to our conditions.

In the first place it may be said that accurate information as regards the marketing of agricultural produce in Mysore is lacking at least as far as the Agricultural Department is concerned. While this subject is one of great importance I doubt if we should be justified at present in appointing a marketing officer. I feel that here, as in the case of many of our other activities, there is a lack of co-ordination which leads to serious waste of effort. There are four organizations in this State which should interest themselves in the question of markets and marketing, the Industries and Commerce Department, the Department of Co-operation, the economics department of the University, and the Agricultural Department. The heads of these departments with a number of non-official associates might, I think, with advantage be constituted into a Board of Economic Enquiry whose duty among others it would be to prepare plans for a study of our marketing conditions and the possibilities of their improvement. Until such an enquiry has been made I feel it would be premature to consider the question of legislation for the control of markets.

In the meantime experimental measures are already being taken towards the co-operative marketing of our new cotton Selection 69. It is hoped during the present year to arrange for the marketing, co-operatively, of the produce from a number of villages where comparatively large areas of this cotton have been grown. Our chief object is to obtain a large supply of pure seed but I have hopes that it will lead, at the same time, to a considerable profit to the sellers. Cotton is not one of our most important crops but the results of efforts in connection with this crop may give us valuable information as to the possibilities of extending this work to other crops as well.

CHAPTER XII.

The Finance of Agriculture.

The Commission in this chapter restrict their attention to forms of finance other than those furnished through co-operative organizations to which they devote a separate chapter. It may be remarked here that throughout the Report the co-operative movement is held up as the hope of the future and the view is expressed that co-operative credit either as short-term credit through ordinary credit societies or as long-term credit through Co-operative Land Mortgage Banks will finally, to a very large extent, supplant all other forms of outside finance for Indian agriculturists.

The main calls on finance in Indian villages are for the following objects:—(a) permanent improvements requiring long-term loans; (b) capital for more expensive implements and machinery requiring loans of intermediate duration; (c) current requirements in connection with agriculture such as the purchase of seeds and manures; and (d) domestic wants and ceremonial expenses.

The main sources of capital for the above purposes (exclusive of that furnished through co-operative credit) are: (a) savings, (b) the village money-lender; and (c) government loans.

As regards long-term credit through money-lenders, which is almost entirely in the form of mortgage credit, there is no reliable data as to the amount advanced in this way in India. An enquiry made in the Punjab in 1920 indicated a total of mortgages on agricultural land of Rs. 35 crores or an average of rather less than Rs. 12 per cultivated acre. Most of this was not incurred to finance improvements and it seems rarely to be used for this purpose. This heavy burden hinders progress in two ways. Firstly, an important source of credit is drained for non-productive purposes. Secondly, the mortgagor frequently declines to the position of a permanent tenant paying, not a fair rental, but the maximum that the land can stand.

The Commission consider the advisability of legislation to prohibit non-terminable mortgages and come to the conclusion, from the evidence they gathered, that no usufructuary mortgages on agricultural land should be permitted without provision for automatic redemption within a fixed period of which twenty years should be the

maximum. They consider that while the risk of evasion of such a law would be great, nevertheless legislation on these lines would be beneficial.

Various measures have been introduced to free agriculturists from the clutches of the money-lenders culminating in the Usurious Loans Act of 1926. The Commission, however, point out that all such measures are simply palliative in nature and that unless and until the agriculturists develop a spirit of thrift and a determination to reduce expenditure on ceremonials nothing can save them from the clutches of the money-lender.

It is much too early to say to what extent the Mysore Agriculturists' Relief Regulation which came into force on the 1st January 1929 will aid in the relief of agricultural indebtedness in this State but obviously it is legislation in the right direction.

The question of introducing restrictions on the alienation of land such as are to be found in the Punjab, the United Provinces and the Central Provinces where it is restricted to certain agricultural castes and tribes seems to be one that cannot be profitably considered in Mysore. Evidence collected by the Commission seems to point to the fact that there is a steady increase of land in the hands of the non-cultivating classes. The Commission suggest the advisability of a thorough enquiry in this connection. I have elsewhere suggested the advisability of having a permanent Board of Economic Enquiry in this State somewhat on the lines of the Punjab board. If such a board were constituted an investigation of this kind could, I believe, be very well conducted under its auspices.

The question of the function of joint stock banks in connection with agricultural credit is discussed, the Commission recognizing the impossibility of their doing more than to advance on produce stored in godowns. We have recently had a proposal to start a joint stock coffee bank in Mysore to finance the coffee crop but it seems rather doubtful if the conditions are favourable for such an enterprise.

The role of the capitalist and landlord in the supply of fixed credit is next discussed. The Commission found little evidence of landlords in India financing permanent improvements. The conditions in Mysore are very similar to those of British India in this regard. The landlord system luckily is much less commonly found in Mysore than in the north of India but it nevertheless forms with us a serious

obstacle in the way of progress. Here as elsewhere the money-lender seems gradually to be replacing the landlord whose possessions have been in the family for many generations. From the standpoint of agricultural improvement there seems little to choose between the two. It is a rare thing to find either of these investing money in the improvement of his land.

The fact that the lands in the possession of these men are in the great majority of cases among the most valuable and potentially the most productive in the State adds to the seriousness of the situation. Large areas in the valley of the Cauvery and its tributaries are in the hands of men who visit their possessions only at the time of harvest and one of the most difficult problems the Agricultural Department has to face is how to introduce improvements into these areas, where the physical conditions are so favourable for their introduction and where the results which could be obtained would be so striking.

Two incidents which have come to my attention in recent years will illustrate the position more aptly than many pages of discussion. During field inspections in the Seringapatam area I observed a crop of short season groundnuts being grown by a ryot in place of the usual green manure crop. It was an experiment which was being tried at the instance of the local agricultural inspector on his own initiative, an exhibition of independent work on his part that greatly interested me. I asked the tenant whether his landlord knew anything of the work he was doing and when he replied in the negative I said I would bring it to the landlord's attention. He implored me not to do so stating that it would lead at once to a demand for increased rent.

More recently the local representative of one of the largest firms in India dealing in commercial fertilizers came to me for advice in connection with their propagandist work in this same area. He told me that although he was convinced that there were very great possibilities for the introduction of commercial fertilizers in our channel tracts their progress had been disappointingly slow. I had to tell him that unless and until the landlords of this area took a greater and more intelligent personal interest in the cultivation of their lands than they now display, progress was likely to be slow.

The incidents I have described must not be taken to mean that no progress is being made in these areas. New varieties of paddy are being generally introduced which promise an increased return to the

ryot with practically no increased outlay on his part and this work is likely to develop greatly in the near future. When it comes to questions of finance for fertilizers there are a number of landowners, of whom I might name Messrs. M. S. Devoji Rao, T. Subba Rao and B. K. Garudachar as examples, who are doing most useful work in this direction. As an example I may note that Mr. B. K. Garudachar has been financing the purchase of considerable quantities of fertilizer for his paddy lands at Gadiganhalli, Yedatore taluk and has been carrying on co-operative experiments on a large scale with these fertilizers which have led to a trebling of the yield on his land during the past five years. The investment has been a very sound one from his standpoint and has, at the same time, greatly increased the returns to his tenants. The effect in the neighbourhood is likely to be great as I was informed that the other landowners in the vicinity were having difficulty in obtaining tenants unless they agreed to follow Mr. Garudachar's example.

The average return to landowners in the channel tracts is not high and I am convinced that they could greatly increase that return were they to take advantage of the information the Agricultural Department has to give them. The establishment of small areas cultivated under their own supervision, the employment of men trained in agriculture as managers of their estates or, better still, the training of their own sons in our Agricultural School to take over the supervision of their lands would go a long way towards the development of this important area. The increased interest in agricultural education among the land-holding classes of the State during the past few years leads me to hope for considerable progress in this direction in the near future.

We come now to the financing of land improvement by Government. As the conditions for the granting of loans for agricultural purposes by Government in Mysore are very similar to those obtaining in British India I shall confine my attention to this State touching upon the views expressed by the Commission only as they affect us.

According to the Mysore Revenue Manual loans for purposes of improving agricultural land are granted in pursuance of the Land Improvement Loans Regulation 1890 (with subsequent amendments) and the Rules thereunder. Advances of a miscellaneous nature for (a) relief of distress among holders of agricultural lands, (b) purchase of

seed or cattle, or (c) any other purpose not specified in the said Regulation, but connected with agricultural objects, are made in accordance with rules issued under Section 194 of the Land Revenue Code. Every such advance, with interest if any, is recoverable as a revenue demand.

Under the heading of Land Improvement and Takkavi, loans for the following objects among others are included :—(1) Loans for coconut cultivation, (2) Loans for reclamation of lands, (3) Loans for irrigation wells, (4) Loans for Saguvali Kattes, (5) Loans for fruit cultivation, (6) Loans for sericultural improvement, (7) Provisions for the sale of agricultural implements on the hire-purchase system, (8) Loans for dairy farms, (9) Loans for horse, pony and cattle breeding, and (10) Loans for agricultural and industrial operations and purchase of machinery. Of these the sale of agricultural implements on the hire-purchase system is under the control of the Agricultural Department, the loans for agricultural and industrial operations and purchase of machinery are under the control of the Department of Industries and Commerce, and those for sericultural improvement are sanctioned by Government. The rest are under the control of the Revenue Department.

The above is a truly formidable list and one would think that almost every need of the agriculturist for the introduction of improvements is covered. The rates of interest charged are, on the whole, very low varying from 4% to $6\frac{1}{4}$ %. In some cases as for instance in the case of loans for dairy farms and for horse, pony, and cattle breeding, they are coupled with the grant of land either outright or on lease, on very easy terms. Nevertheless the agriculturists of Mysore, on the whole, seem to be making comparatively little use of these concessions and, according to the Commission's Report, the same conditions in this regard are to be found in British India.

The Report of the Revenue Department for 1927-28 shows that the total number and amount of applications received for various purposes were as follows :—

	No. of applications received.	Amount.		No. of loans sanctioned.	Amount sanctioned.	
		Rs.	A. P.		Rs.	A. P.
Takkavi Advances ..	1,464	2,08,107	8 0	894	79,821	8 0
Land Improvement Loans ..	1,068	4,89,315	0 0	431	95,730	0 0
Loans for Irrigation Wells ..	108	33,975	0 0	34	9,025	0 0
Total ..	2,640	7,31,697	8 0	1,359	1,84,576	8 0

The table above is compiled from the figures contained in the body of the Report. The figures given in Table XVI of the Appendix to the Report for amounts sanctioned are slightly higher.

One might be led to believe from the figures in the above table that these agricultural loans are not being administered as liberally as they should be, but when we learn that the collection of instalments was 54.5% for takkavi, 65% for land improvement loans and 69.4% in the case of loans for irrigation wells, one is led to believe that revenue officials have been as liberal in the granting of loans as they safely could be under the existing conditions. The complaints of delays in the granting of loans as well as other complaints of a more serious nature are considered by the Commission and their conclusions are as follows:—"Delay in dealing with applications is a frequent cause of complaint but some delay is inevitable where enquiries have to be made into the prospects of the improvement and into the nature of the interest in land which is offered as security for the loan. Local Governments appear to be fully alive to such defects as exist in the rules and to be ready to adopt remedies. In these circumstances we have no recommendation to make for improvement in the Act, the rules framed under it, or the manner in which it is administered except that stricter supervision might be exercised to prevent the leakage to which, judging from the evidence before us, some loans are at times subject."

I have little to add to the views of the Commission except to suggest the possibility of the Revenue Department availing themselves more freely of the advice of technical officers where a consideration of the necessity of the loan and the real benefits that may be derived from its utilization are concerned. I am glad to note an increasing

utilization of the services of the Agricultural Department in this connection. It has already been pointed out in another connection that all loans for pumping installations received by the Department of Industries and Commerce are, as a matter of course, sent to the Agricultural Department for report on the suitability of the land for well irrigation. I have suggested in another place that if and when a well sinking section is established in the Agricultural Department the services of this department could be utilized in connection with the granting of loans for irrigation wells. I believe also where there is a question of granting comparatively large loans of say Rs. 1,000 and over for agricultural improvements, the opinion of the Agricultural Department should prove of value and that the procedure in this connection which is now being adopted in a few cases might be made general.

The Commission in their Report deal separately with the loans granted under the Land Improvement Act and those granted under the Agriculturists' Loan Act, these latter corresponding roughly to our takkavi and other loans under the Land Revenue Code and they point out that in neither case can these be expected to meet more than a small portion of the needs of agriculturists. As already stated, they look to the development of co-operative credit to meet those needs.

The remainder of this chapter is devoted to the question of agricultural indebtedness. After discussing the various causes which lead to borrowing they emphasize the fact that the money-lender is, equally with the borrower, controlled in his actions by economic laws. In other words, he must find an outlet for his capital just as the borrower is compelled to borrow money for his needs.

The causes which have led to debt are described as follows :—

“ The maintenance of law and order, the defining and recording of rights in land, the continuous reduction in the proportion borne by the land revenue demand to the produce, the rise in the value of that produce and the growth of transferable rights in land, have all contributed to enhance the credit of the landholder. The rapid development of commerce and trade, the introduction of established law and permanent civil courts and the enactment of such measures as the Contract Act have strengthened the position of the money-lender. His capital has been swelled by the accumulating profits of

his business which has been extended by his own thrift and intelligence. The general expansion of credit has provided scope for the investment of his savings and has averted that competition from his fellows which might otherwise have forced down the rate of interest. Throughout these developments, the cultivator has continued, in the main, illiterate; he keeps no accounts and makes no distinction between sums expended on the needs of his industry and those expended on the requirements of himself and his family. For generations he has been accustomed to a ceaseless struggle to extort a bare livelihood from an insufficient holding and has been subject to disaster from drought, flood or epidemic. Causes which he seldom understands and cannot influence have endowed him with credit which he did not formerly possess, and he has found it difficult to resist the temptation to relieve present necessities by mortgaging his future income and even his capital.

“There are other factors. Amongst the comparatively poor, where the habit of saving is not strong, the longer the interval between the successive receipts of the return for labour the more difficult it becomes to avoid borrowing. If wages were paid monthly instead of weekly, only a very small proportion of the working classes in the world could exist without credit; but the cultivator has to wait for half a year before he receives the return of his labour, and in far too large an area where there is only one crop a year, the interval between successive receipts may be full twelve months.”

A consideration of the various legislative enactments in different parts of British India which have, as object, the freeing of agriculturists from the clutches of the money-lender, leads the Commission to the conclusion that little permanent benefit has been derived from their operation. In some cases it appears to have led actually to an increase of indebtedness. The Commission believe that the Usurious Loans Act of 1918 could be made of real value in this connection but note that the evidence they have received shows conclusively that the Act is practically a dead letter in all the provinces. The only recommendation they have to make is that an enquiry should be held in all provinces as to the causes of failure.

This whole chapter is a very depressing statement of failure in the efforts made by Government through special legislation, reduction of taxation and direct loans to relieve agricultural indebtedness. As

already stated, the Commission look to the co-operative movement as the hope of the future. In concluding my comments on this chapter I can do no better than quote a paragraph in which they summarize their views in this regard.

“Turning now to the future, we have no hesitation in recording our belief that the greatest hope for the salvation of the rural masses from their crushing burden of debt rests in the growth and spread of a healthy and well-organized co-operative movement based upon the careful education and systematic training of the villagers themselves. Co-operation will be dealt with at length in the next chapter but here we would state our view that, apart altogether from the question of debt, co-operative credit provides the only satisfactory means of financing agriculture on sound lines. Thrift must be encouraged by every legitimate means, for the savings resulting from the thrift of the cultivating classes form the best basis of the capital they require. If the rural community is to be contented, happy and prosperous, local governments must regard the co-operative movement as deserving all the encouragement which it lies within their powers to give.”

CHAPTER XIII.

Co-operation.

It would, I consider, be beyond my province to discuss in any detail this chapter on co-operation. Of its thirty pages, twenty-three are devoted to the organization and staffing of co-operative departments and to co-operative credit including the question of the establishment of Land Mortgage Banks on a co-operative basis. Much has already been written on these phases of co-operation in Mysore and I cannot add anything of value. I shall, therefore, confine my attention to the subject of non-credit co-operation as it affects agriculturists and to other means which lie within the power of the co-operative movement to further agricultural development in Mysore.

The first question to consider is the extent to which Co-operative Societies can and should combine, with their avowed function of providing credit, with other functions which are of direct benefit to agriculturists.

It is generally recognized that the organization of co-operative credit must, for many years to come, be the main function of Co-operative Departments. It is also equally clear that in the great majority

of cases there are not a sufficient number of intelligent and public-spirited men in a village to make possible the formation of separate co-operative organizations with separate staffs. This has led in Mysore, as elsewhere, to the utilization of co-operative credit societies for non-credit operations. The Commission note that where the secondary object is of minor importance, such as the distribution of seed once or twice a year, or where the work involved is too slight to justify the establishment of a separate society, the credit society has usually undertaken the additional duty. That is what has happened in Mysore. The Report places special emphasis on the necessity of utilizing the medium of Co-operative Societies wherever possible in all work of agricultural demonstration and propaganda. They point out that members of such societies are more likely to be receptive of new ideas than others and that demonstration work is much more effective if carried on with organized bodies than with individuals. Demonstration and propaganda in connection with the introduction of improved seed, commercial fertilizers and improved implements are obvious examples of the kinds of work which can be carried out most efficiently in this way.

The Co-operative and the Agricultural Departments in Mysore have been working in a most cordial association for a number of years in the development of the demonstration and the introduction of improved implements, seeds and manures through co-operative societies.

During the year 1927-28 there were 129 co-operative societies in Mysore which carried on agricultural work and they transacted a total business amounting to Rs. 21,758-1-11. As will be noted, the total business is not large but indications are not wanting that there will be a very considerable expansion during the next few years.

More recently two developments have taken place which promise a closer co-ordination of the work of the two departments in the future. One of these is the sanction by Government, as an experimental measure, of the employment of an experienced agricultural inspector to work in the Co-operative Department exclusively on the development of this work and of agricultural co-operation in general. If the usefulness of this appointment is demonstrated, as I am sure it will be, I have no doubt that further appointments of the same kind

will be sanctioned. I believe that there is room for one such officer in each district.

The other development has to do with the co-ordination of the work of Co-operative and Agricultural Inspectors. As a result of a thorough discussion of the subject at the Departmental Conference in 1928 in which the Registrar of Co-operative Societies took an active part, it was arranged that one week of each month should be set aside for a combined tour of the co-operative and agricultural inspectors in their ranges for the purpose of stimulating agricultural co-operation. This arrangement has been in effect for only about one year but there is already evidence that it is leading to practical results. The monthly summaries of work submitted to me by agricultural inspectors show that co-operative societies are in this way being induced in considerable numbers to take up some form of agricultural work.

The recent appointment by Government of a special officer and staff in the Agricultural Department to supervise the distribution of new varieties of crops will enable us to utilize the services of co-operative societies more fully than we have in the past, for I propose that, as far as possible, all subsidiary seed farms should be established and all seed from them should be distributed with the aid of co-operative societies. This is, I consider, one of the most important developments that has taken place in the Agricultural Department since my return to duty.

As to the organization of special co-operative societies for purchase and sale and for such purposes as cattle breeding, cattle insurance, better farming and such like, I believe we should proceed very slowly. I might point out, however, that the organization of an agricultural colony will almost certainly give an opportunity for co-operation in the use of machinery, such as tractors and sugarcane milling machinery and the co-operative purchase of all the necessities of the colony. Whether co-operative sale of the produce from the colony will also be possible remains to be seen.

Cattle-breeding societies can develop only after we have a regular supply of good breeding bulls to supply to them, something which will have to await the development of a breeding station. Cattle insurance would be possible only if we could assure at least qualified immunity from the contagious diseases which attack our live-stock.

We seem on the way to this as regards our most important cattle disease, rinderpest, but there are so many other diseases for which we have treatments affording at the best but temporary immunity that, I believe, cattle insurance will have to be postponed to a somewhat distant date in the future.

Altogether I consider the work in connection with agricultural co-operation in Mysore is being carried out on sound lines and that we do not need to fear comparison in this regard with other parts of British India.

CHAPTER XIV.

The Village.

In this chapter the Commission deal with questions connected with the health and sanitation of the village, the nutrition of the people and in general with what is commonly called village uplift.

The chapter opens with a description of the characteristic features of village life as it has been in the past and, to a large extent, still is. Poverty, illiteracy, lack of sanitation are the evil features of village life, simplicity and self-reliance its good ones.

Upon the simple life of the village are now impinging outside influences. Industries, usually small ones and connected with agriculture, are developing in the small country towns and villages, the beginnings of the industrialization of the countryside. This, together with the improvement of communications, is leading to specialization of agriculture with the production of commercial crops including fruits and vegetables. The invasion of villages by the buyers of large exporting firms and by the agents of implement and fertilizer manufactures has begun and while it has not affected more than a very small proportion of the villages has great potentialities for the future. Perhaps more than anything else the motor passenger services are breaking down the isolation of the villages.

In Mysore, the general organization under the leadership of the Central Government, of village panchayats linked up with the district administration and the delegation to these panchayats of very important executive duties such as those connected with village sanitation, the construction and repair of village roads, the control of schools, is a very important recent development. The report of the Mysore Revenue Department for 1927-28 shows that 8,863 village panchayats

and 240 hamlets had been constituted up to the end of that year and that the preliminary work of constituting panchayats is practically completed. Out of this total 7,910 have taken action to levy obligatory taxes and 430 have agreed to levy optional taxes. In over 3,000 panchayats, weekly meetings are being held and labour for communal benefit such as the clearing of lantana and prickly pear, filling of insanitary pits and cess-pools, improvement of village communications, planting of *topes* and roadside trees, is being undertaken. All of this points to a very marked quickening of village life, and, considering that the organization of these panchayats represents a work extending over only one and a half years, holds great promise for the future. I might mention here the work that village panchayats are undertaking in connection with the introduction of agricultural improvements. An increasing number are purchasing improved ploughs for hiring out in the villages while some are stocking commercial fertilizers for sale to ryots in the village. An important problem for the Agricultural Department in the future will be how best to utilize these organizations to further demonstration and propaganda work.

An important section of this chapter is devoted to questions connected with villagers' health and great emphasis is placed on the very serious effects of contagious disease both in regard to definite loss of life and also in regard to the marked decrease in efficiency of the population owing to the prevalence of such diseases as malaria and hookworm disease.

The Commission quote the following resolution of the All-India Conference of Medical Research Workers in 1924 :—

“ This Conference believes that the average number of deaths resulting every year from preventible disease is about five to six millions, that the average number of days lost to labour by each person in India, from preventible disease, is not less than a fortnight to three weeks in each year, that the percentage loss of efficiency of the average person in India from preventible malnutrition and disease is not less than twenty per cent and that the percentage of infants born in India who reach a wage-earning age is about 50, whereas it is quite possible to raise this percentage from 80 to 90. The Conference believes that these estimates are under-statements rather than exaggerations, but allowing for the greatest possible margin of error it is

absolutely certain that the wastage of life and efficiency which result from preventable disease costs India several hundreds of crores of rupees each year. Added to this is the great suffering which affects many millions of people every year."

"This Conference believes that it is possible to prevent a great proportion of this waste at a cost which is small in comparison with the expenditure.

"The recent census shows that the position in India is one of grave emergency. The Conference recognizes that the problem is very complicated and involves not merely medical research but also questions of public health, medical relief, medical education, propaganda and social and economic considerations."

* * * * *

"The Conference believes that the greatest cause of poverty and financial stringency in India is loss of efficiency resulting from preventable disease and, therefore, considers that lack of funds, far from being a reason for postponing the enquiry, is a strong reason for immediate investigation of the question."

As far as the effect of deaths from contagious diseases is concerned there might be reason for difference of opinion. We are being continually reminded of the pressure of population on the land and leaving out all humanitarian considerations, the action of contagious diseases in helping to relieve that pressure might be looked upon, from an economic standpoint, as not an unmixed evil. Few of us, however, would be prepared to use that as an argument in favour of a policy of inaction. Whatever may be said as to the effect of reduction of population, nothing can be said in favour of the great reduction in efficiency that is one of the most striking effects of our contagious diseases. The Conference of Medical Research Workers look upon this as the greatest cause of poverty and financial stringency in India and while this may be exaggeration no one can doubt that an effective control of contagious disease would greatly increase the efficiency, prosperity and happiness of our agricultural population.

The measures that are being taken to improve village health and sanitation in British India are next discussed. The importance of the organization of separate departments of public health is emphasized. The Madras Department of Public Health is taken as an example of what is necessary in this regard. In Madras, there is a Director of

Public Health with three assistant directors in charge of different branches of public health work. "A trained health officer is now in complete charge of the public health administration of a district and in each taluk there is at least one health inspector who works under the immediate supervision and control of the district health officer. There are now 26 district health officers and 261 health inspectors. This health staff also supervises the work of the vaccinators employed by local bodies. Members of the health staff are government officers and their services are placed at the disposal of the local bodies to carry out the provisions of the Local Boards Act (1920) which deals with the health, safety and convenience of the rural population. The salaries of all health officers in rural areas are paid by Government but the whole expenditure in connection with the prevention of epidemics and the improvement of sanitation is a charge on local bodies."

The various measures that have been introduced or have been proposed to provide medical aid in the villages which are out of reach of hospitals, dispensaries or ordinary medical practitioners, are next discussed. In the first place, we have the scheme introduced in the Bombay Presidency whereby selected primary teachers are given 2½ months' training in hospitals. These men give aid to villagers in minor ailments and send in more important cases to the nearest hospital or dispensary. In the first sixteen months thirty men so trained are said to have treated 120,000 cases and apparently even the civil surgeons approve of the work. To a mere layman in medical matters this would appear to be a rather risky experiment. It is explained that the work is being done in villages so situated as to make frequent inspections by medical officers possible which seems to me to detract very materially from the value of the scheme as far as the possibilities of its general introduction are concerned.

As the Commission state, the position of headmaster in a village should enable him to exercise considerable influence in matters connected with rural sanitation and hygiene. One would be inclined to think that a course of public health training for school masters would lead to more beneficial results than a course in first aid as given in Bombay. My own feeling is that most of the 120,000 cases said to have been treated would probably have got along about as well without the medical aid which could be supplied by this type of village

practitioner as with it. However, that is really a matter upon which only a medical man could speak with authority.

The other scheme noted by the Commission is that involving a monthly subsidy to medical practitioners to induce them to live in villages. The Commission consider that such schemes should be encouraged but at the same time admit that economic pressure will ultimately compel medical men to start practice in our smaller towns. This is again a question upon which medical men should express an opinion as also with regard to an even more important one, the training of nurses and midwives.

The importance of village wells from a health standpoint and the necessity of replacing step wells by lift wells with parapets is emphasized. I believe in no part of India is the question of village drinking water supply receiving more practical attention than it is in the State of Mysore.

The possibilities of the employment of non-official agencies for health and welfare work in the villages is next considered and the work of such organizations as the Seva Sadan Society and the Y.M.C.A. is commended. Recently the Board of Agriculture has had up for consideration a proposal by Dr. Kunhi Kannan for the stimulation of social service in villages. My own feeling is that in such matters Government should interfere as little as possible but where there is definite evidence that valuable work is being done by non-official organizations, Government should assist it financially.

The need for scientific investigation, both as regards health and nutrition, is emphasized. The Indian Research Fund Association, an organization combining official and non-official control and finance which is financing investigation work all over India on such important diseases as plague, cholera, malaria and kala-azar as well as questions connected with diet deficiency, is looked upon as an excellent example of official and non-official co-operation.

I believe that the Mysore State has no connection either officially or unofficially with this association. However, recently a co-operative health scheme in which the Mysore Government co-operates with the Rockefeller Foundation has come into being. In connection with this scheme proposals have been made for co-ordination of investigation work on problems affecting the health of men and animals. I

believe that an organization of a Public Health Institute in Mysore to co-ordinate and expand the work of the present Public Health Laboratory, the Vaccine Institute and the Serum Institute would open up great possibilities of useful work. Such an institute should, if organized, provide for much more than the preparation of sera and vaccines and for the routine analyses of a public health laboratory. It should make definite provision both in staff and equipment for investigation work. The effect of the establishment of such an institute in the State would, I believe, be very great.

The general uplift of village life is dealt with at considerable length. It is a subject which lends itself to lengthy discussion without anything very definite emerging. The objects of village uplift are obvious and need not be detailed. The agencies are perhaps not so obvious. We have our village panchayats and the revenue officers from revenue inspectors upwards who are interesting themselves in their development. The village panchayats are, I think, undoubtedly the bodies through which village uplift must be accomplished. The question is whether separate organizations such as the Rural Community Councils of the Punjab and special agencies such as the Village Guides which are a feature of the uplift of work of the Gurgaon district, are required. My own feeling is that a multiplication of organizations is likely to lead to work at cross purposes and I should certainly favour using the existing organizations rather than adding to them. It seems highly probable that the village uplift work that has been carried out in the Gurgaon district of the Punjab owes its pronounced success to the personalities of Mr. and Mrs. Brayne and I would venture to predict that with their departure from the district the work will suffer a severe set-back. I believe, however, that one of the weaknesses of our present situation is the lack of contact between district boards and the village panchayat organization. After all it is among the members of the district boards that we should expect to find leaders of the people who would interest themselves in the general improvement of village life. Possibly the district economic superintendents could add to their somewhat hazily defined duties those connected with a stimulation of interest in the social and material development of the villages.

The chapter closes with a discussion of the problem of the depressed classes, a subject upon which I feel I have nothing useful to say.

CHAPTER XV.

Education.

The chapter opens with a discussion of primary education in India more especially as it affects the rural areas. The Commission emphasize the generally recognized fact that the economic progress of a State depends to a very great extent on the extension and improvement of primary education.

They discuss the present condition of primary education in India and note that while the number of pupils undergoing primary education of any kind is lamentably low, the position is made immensely worse by the fact that a very large proportion of the boys who attend these schools do so for too short a time to receive and retain any useful training. The conditions among girls both as to percentage attendance and continuity are very much worse than among boys. It would seem that in general throughout India about half the money being spent on primary education is, on this account, being wasted. One of the means suggested to overcome this difficulty is the establishment of co-operative education societies in which the members bind themselves to send their children to school continuously for a definite number of years (four years), any failure to do so resulting in penalty. These societies seem to have been decidedly successful in the Punjab. A contract system whereby the parent makes a deposit on the admission of children into school which he agrees to forfeit if he withdraws them before a specified period has elapsed is another method suggested by the Commission as worthy of trial. They consider, however, that a system of compulsory education will have to be introduced if the evils at present existing are to be overcome. This will, of course, have to take place gradually.

I am not qualified to speak on the subject of primary education in Mysore and must leave to others a consideration of the recommendations of the Commission in this regard.

The question of adult education has also an important bearing on agricultural progress, for, were we able to give to adults in rural areas training in the three R's on a large scale, we should be able to advance agricultural progress by a generation. Here again I feel it is for others to consider whether real progress in rural areas is possible in Mysore.

In connection with secondary education the Commission concern themselves almost exclusively with agricultural education in the secondary schools. As is well-known this problem has been tackled in two quite different ways.

In the first place, we have the type of school first experimented with in the Bombay Presidency where the course extending over two years is confined to the principles and practice of agriculture with the elements of the sciences connected with it. The schools giving this course are definitely vocational schools and are intended to fit the pupils who are between fourteen and seventeen years of age for work on their own lands rather than for government employment.

Schools of this type have been established in Bombay, Madras, Bengal, the United Provinces and the Central Provinces. The general experience has been that they are very expensive and are not popular. A number of them have already been closed and, as far as one can gather, none has been found to meet a real demand on the part of agriculturists. The Commission in the light of the evidence they have collected, go so far as to recommend the closing of all the schools already started and the abandoning of this type of agricultural education altogether. Two members of the Commission, Messrs. Gangulee and Kamat, consider, however, that the question should be examined as to whether the cost of running these schools could not be greatly reduced by the abolition of free lodging and boarding. The following quotation expresses their position :—“ They agree that there is no justification now for providing, free of cost, agricultural education for the sons of well-to-do cultivators ; and they hope that with the increasing support these schools have recently received from local bodies it would be possible to make the instruction more efficient and less expensive than it is at present. Should the removal of the concessions now enjoyed by the pupils result in reducing the attendance, it would then show that there was no real demand for this type of education ; and the local Governments would then be justified in closing the schools.”

The conclusions given above are of considerable interest to us in Mysore as there has been recently a growing demand on the part of district boards and other local bodies for the establishment of schools more or less on this type.

We have at present one such school at Chikkanahalli in the Tumkur district. This school owes its existence to the generosity of the late Mr. Ugre Gowda who handed over a valuable building and land for the purpose. From the standpoint of Government, therefore, the cost of starting this school has been comparatively small. The same can be said of the school which has been recently opened at Ramakrishnapur in the Bangalore district. This school has been most generously endowed by Mr. G. Venkataramanaiya so that the actual cost to Government has been insignificant. The school recently started in Hassan is being largely supported by the district board and I have no doubt that the school which it is proposed to start in the Mysore district will also be generously supported by the district board of that district. There are more or less definite proposals to start schools of the same type in the Kadur, Shimoga and Chitaldrug districts also; so there seem prospects of having one of these schools established in each district.

What has been the experience in connection with the one school which has been in operation for some time? The Chikkanahalli school was opened in 1916. The course has been from the first a one year's course against the two years' course in this school of Bombay and elsewhere. Thus while the annual cost per pupil has been about the same as in Bombay (between Rs. 250 and Rs. 300) the total cost per pupil has been about one-half. Our students are, on the whole, considerably older than those in Bombay and the course is even more definitely a vocational one. As the course extends practically throughout the twelve months, the actual amount of instruction given as well as the standard of instruction is not very far short of that in the schools elsewhere. Of 151 students who have undergone the full course in the school since its establishment in 1916 only 42 are at present employed as fieldmen in the Agricultural Department. No investigation has been made of the fate of others but it is presumed that they have gone back to the land. One or two have, it is known, been employed by large landowners to help in the management of their estates.

One of the chief items of expense in connection with this school is that involved in the feeding of the pupils. I am inclined to believe that were this concession withdrawn the school would have to close its doors for lack of pupils. The school is at present serving as a

satisfactory training place for our agricultural fieldmen. If my views that we should have as our goal 2 fieldmen in every taluk are accepted and if in addition co-operative societies either singly or in association come to employ fieldmen to further their agricultural work, we might easily develop a steady demand for from twenty to thirty men per annum for this purpose alone. It appears probable, therefore, that there would be room for two schools in the State exclusively for the training of fieldmen. Even were we to accept the conclusions of the Commission in connection with these schools I still believe that we should be justified in retaining the Chikkanahalli school as a training school for this purpose.

I shall now consider the position of the other vernacular schools which have been or are about to be opened in the State.

The Ramakrishnapur school, as already stated, owes its inception to the generosity and public spirit of Mr. G. Venkataramanaiya. This gentleman has endowed the school with a sum of Rs. 7,500 and an area of 233 acres of land which, if it were properly worked, should provide all the money and produce necessary for the feeding of the students and even for the annual cost of the school. It may, however, take two or three years to bring the estate to the state of cultivation necessary to achieve this end. The school will, in the first instance, accommodate 12 to 15 students and I should favour the introduction of a two years' course as an experimental measure. Out of the total area not more than thirty or forty acres will be required for the school itself. The balance will, as at present, be leased out and I would strongly favour trying the experiment of leasing out blocks of from 20 to 25 acres to the passed students of the school for a period of five years.

The complaint is frequently made that the young men trained in our agricultural schools do not gain a sufficiently practical knowledge of agriculture. If these men are given an opportunity to cultivate, under adequate supervision, a compact area of land they will be able to obtain a most excellent training so as to fit them for the cultivation of their own land or for employment as managers of large estates. This arrangement would also allow most favourable conditions for an experiment in the co-operative use of some of the more expensive agricultural implements and also in the co-operative purchase of manures and the sale of produce. It is needless to say that if the

activities at Ramakrishnapur are to be expanded in the way suggested, it will necessitate the placing of a very efficient officer at the head of the institution. I consider that the facilities afforded at Ramakrishnapur warrant its being made a centre for important experiments in connection with rural development.

In regard to the school at Hassan, already opened, and to the other schools which it is proposed to open, I feel on much less secure ground. An attempt is being made at Hassan to conduct the school as a non-boarding institution. The school has been in operation only since the beginning of January 1929 and it is too early to express a definite opinion. However, there are indications already that this arrangement is not likely to be successful. When I visited the school recently I found that while there were eleven pupils on the rolls, the average daily attendance had been only $6\frac{1}{2}$. All the students so far enrolled are, I believe, residents of the Hassan taluk and I am very doubtful if students will be attracted from greater distances unless a free hostel is established. There is, I understand, a proposal to establish a combined hostel for the engineering and the agricultural school and to set apart an area of land under a new channel in the Belur taluk to provide funds for the running of this hostel. The proposal is, I believe, a good one and an arrangement whereby the students from the two technical schools would live together should react favourably on both institutions. The actual initial outlay on this school has been very small and the proposals for the future, involving as they do the utilization of buildings now occupied by the district hospital, will ensure a low capital expenditure. The experiment is, therefore, worthy of continuance. The question of opening further schools should, I believe, be carefully investigated by a special committee in the light of the Royal Commission's recommendations. I am inclined to think that such schools should be opened only where there is a strong demand on the part of district bodies backed up by an assurance of local contributions sufficient to cover half the initial and recurring charges of the school.

We come now to a consideration of the second type of secondary agricultural instruction considered by the Commission. This is the type which has been most extensively developed in the Punjab. The following quotation from the Report gives a concise description of the Punjab scheme and its development :—

“ The Punjab Educational Department has dealt with the problem on entirely different lines. In that province, elementary agriculture is included as an optional subject in the curriculum of the ordinary vernacular middle schools. In the words of a circular which was issued in 1923 : ‘ The aim is to enrich the middle school course in rural areas by the inclusion of agricultural training and thus to bring it more in keeping with the environment of the pupils ; and the object is to use agriculture as a means of mental discipline and training and as an important accessory to the general subjects taught in these schools.’

“ Under this system, the instruction given in the class room is both illustrated and supplemented by practical work in all agricultural processes on the land. For this purpose, farms of about three acres in extent were attached to the schools in which the new course was first introduced but, owing to financial stringency, the alternative of school gardens, half an acre to an acre in extent, was adopted in 1923. Six periods per week are devoted to the course by each of the four classes which make up the vernacular middle school in the Punjab. All the work on the farms and gardens except that of looking after the bullocks is done by the boys themselves and it is interesting to note that many of the farms and gardens are not only self-supporting but have an annual balance to their credit. The teaching is in the hands of trained and carefully selected teachers who have first taken the ordinary senior vernacular training course and have then completed a separate course in agriculture at the Lyallpur Agricultural College. An additional link between the agricultural and educational departments is provided by the fact that the general supervision of these activities is entrusted to an adviser in agricultural training who is an officer of the Education Department. His headquarters are at the Lyallpur Agricultural College. When we visited the Punjab, there were 66 schools of this type, 26 of which had farms attached to them and 40 had gardens. It was hoped to increase the number in 1927-28 to 121, of which 64 would have farms and the others gardens.”

The same type of agricultural education has been introduced in the United Provinces where there are about twenty secondary schools giving agricultural instruction and in Bombay where there are forty-three such schools. In both the United Provinces and Bombay the agricultural teachers in the school receive preliminary training not in

the agricultural college but in one of the special agricultural schools referred to above.

It may not be out of place here to remind the readers of this note that a scheme in all essentials similar to the one just described was inaugurated in the Mysore State as long ago as 1915. Agricultural instruction of this type has been given in the schools of the province of Ontario, Canada, for the past twenty-five years and it is existent now in most of the provinces of Canada and in most parts of the United States. In my "Report on Agricultural Education", published in 1914, I described the work that was being done in Canada in this connection and pointed out the immense possibilities this type of instruction held out for an agricultural country such as India. A beginning was made in this State in 1915 but the scheme was later on given up. The discontinuance of this work gave me one of the bitterest disappointments I have ever experienced. The scheme has been recently revived in Mysore under more favourable conditions.

One of the main factors which has contributed to the success of this scheme as it has been developed in the Punjab is, in my opinion, the close co-operation that has existed between the Educational and Agricultural Departments. This has been ensured, in the first instance, by the special training of the teachers in the Agricultural College and in the second instance by the employment of a special adviser in agricultural training who, though working in the Educational Department, has his headquarters at the Lyallpur Agricultural College and so is kept in very close touch with the work of the Agricultural Department. I personally consider that a very much closer co-operation between the Educational and Agricultural Departments than now exists in this State will have to be established if this scheme is to achieve a full measure of success in Mysore.

The chief criticisms of the special vernacular agricultural schools are the high cost of instruction and the lack of real demand on the part of the agricultural population. The main criticism of the so-called Punjab scheme is that the students who undergo the training will prefer to become teachers and village accountants rather than to farm their own lands. As the Commission point out, however, there will be a large number who must perforce return to the land while, of course, the very much larger number of pupils who will be reached by this scheme will lead to a much more widely spread influence of the agri-

cultural instruction given. The views expressed by the Commission are identical with those expressed by me fifteen years ago and I sincerely trust that the successful introduction of this scheme in other parts of India will induce us to follow where we could not lead.

The question as to whether there should be attached to secondary schools giving agricultural instruction, a farm of about three acres or a garden of one half to one acre is also considered. The Commission point out that while the smaller area is more easily handled, the larger area is to be preferred where the teacher is competent to demonstrate the latest improvements and can be properly supervised by officers of the agricultural department. The larger area in addition to furnishing facilities for practical instruction to the boys will also serve as a centre of demonstration to the whole village and can thus materially aid in the introduction of agricultural improvements. In at least one middle school in Mysore where agricultural instruction was introduced in 1915 the interest aroused among the villagers was so great as to lead me to hope for very marked results from these small school farms. Adequate training of the teachers and close association with the work of the Agricultural Department are, however, undoubtedly essential to success.

Logically following the question of agricultural education in middle schools is that of the advisability of introducing this subject into the high school curriculum as well. The fact that most of our high schools are situated in comparatively large towns and the further fact that most of the high school students are drawn from the urban population make the introduction of this subject here a matter of much less importance. The Commission, however, point out that where high schools draw a considerable proportion of their students from rural areas the introduction of agriculture as an optional subject is advisable. In such cases provision for practical instruction would also have to be made. I am personally of opinion that until in Mysore our agricultural classes in middle schools have been greatly developed, the question of providing similar but higher agricultural courses in the high schools should be kept in abeyance.

In connection with higher education, the Commission's views on the constitution and curricula of agricultural colleges and their affiliation to universities are of importance to us. In British India there has, in recent years, been a gradual but steady raising of the

standard for entrance to the regular courses of agricultural colleges coupled with a growing movement towards the affiliation of these institutions to the local universities. The agricultural colleges at Coimbatore, Poona, Nagpur and Lyallpur are already affiliated.

The entrance qualifications have been raised in the case of Coimbatore to the standard of the intermediate in science while in Poona candidates are required to have undergone one year's university training. In the case of the two former institutions the course for the degree in agriculture extends over three years, in the case of the latter two, over four years. The Commission are of opinion that the entrance standard should be raised in all colleges to that obtaining at Coimbatore and that under these conditions a three years' course should be sufficient.

The Commission fully recognize that these colleges function at present mainly as training institutions for the staffs of the agricultural departments and that while conditions are slowly changing this is likely to be the case for some years to come. They agree that while it would be inadvisable to give agricultural graduates preference over those in arts or science for appointments to other government departments, in the case of such departments as revenue, co-operation and irrigation, they should be considered as on an equality with the latter.

In connection with the staffs of agricultural colleges, the Commission emphasize the great importance of choosing men of a very high standard. They consider, for instance, that the position of principal should be looked upon as practically on a par with that of Director and suggest that where an able principal has through seniority a claim on the post of Director he should not be disturbed but his pay should be raised by a personal allowance to an equality with that of the Director. They further express the view that the professors and lecturers should not necessarily be drawn from the staff of the department. Where specially capable men are available outside they should be appointed to the college staff, even where they have not had definite agricultural training. They instance the policy followed at Rothamsted where investigators have been chosen much more for their knowledge of the basic sciences than for their knowledge of agriculture. They consider the question as to whether teaching should be divorced from research and rightly conclude that it is very inadvisable to do

this. A science teacher who does not engage in research is likely to lack inspiration.

In higher agricultural education we have, in Mysore, lagged behind British India. Our Hebbal Agricultural School was started in 1913 with a two years' course and the matriculation standard was not insisted upon for entrance. In 1920-1921 the course was extended to three years and the qualification for admission was fixed at the University Entrance standard. Realizing that the school was more or less of an experiment it was started with a very modest initial expenditure, buildings already existing on the Hebbal Farm being adapted for the purpose of the school. The only buildings actually constructed for the school were those for the hostel. The total non-recurring expenditure on buildings upto the present has not exceeded Rs. 30,000.

The passed students of the school have found employment largely in the Department as agricultural inspectors. Of the total of 120 students who have passed out up to the present 48 are now employed in this way. The remainder are for the most part engaged in the cultivation of their own land or are in the employ of the large fertilizer organizations who have of recent years taken up extensive propaganda work in the State. The following gives the present employment of our passed students as far as is known :—

Total number who have undergone full course between 1913 and 1928	120
Number employed in the Agricultural Department.	48
Number employed in other departments in Mysore and elsewhere	23
Number in other employ where a knowledge of agriculture is required or engaged in cultivating their own land	33
Number whose occupation is unknown	16
Total ..	120

The total number who have been trained in the school is not large and the number known to be engaged in employment outside of government service where a knowledge of agriculture is required is just over 25% of the total. The probability is that this figure is

decidedly lower than the actual, for of those whose occupation is unknown it seems certain that several are engaged in occupations where a knowledge of agriculture is required. I may point out here that during the past two or three years there has been a very marked increase in applications for seats in the Hebbal School. Our entrance class last year was twenty-seven which is about 50% higher than that of any previous years. There are, I think, quite definite indications here as in British India that an increasing number are turning to agricultural education for purposes other than government employment.

The establishment of an agricultural college in Mysore affiliated to the University has been frequently discussed during the past ten years. The subject has been before the University Senate more than once and the Reorganization Committee appointed by that body has included a scheme for agricultural education in the University structure they propose.

I have personally been opposed to early action in this connection for two reasons. In the first place, I did not see any real demand on the part of agriculturists in the State for higher agricultural education. It seemed, therefore, probable that a college, if established, would serve as one more training ground for government service and a fairly expensive one at that. In the second place, I knew that a well-organized agricultural college would be a costly institution and I was averse to diverting any of the too meagre funds allotted for agricultural development into any channels but those which were likely to prove profitable in the near future. I have, therefore, favoured the utilization of the funds available, for research and demonstration rather than for education.

Let us consider the needs of the State at present as regards agriculturally trained men. The Agricultural Department will undoubtedly require a steadily increasing number of men for research as well as for demonstration work. For research work we are not confined to agriculturally trained men although undoubtedly an agricultural training would be beneficial. Most of the staff in our so-called scientific sections (of botany, mycology, entomology and chemistry) are science graduates, not graduates in agriculture. For demonstration work, for the management of experimental farms and for the running

of agricultural schools, agricultural training is absolutely necessary. I have already stated that we should have at least one agricultural inspector for every taluk and an assistant director for each district. In addition, men will be required for the various farms, for the organization of cattle and sheep breeding work and for agricultural schools. For all these we shall require a minimum of 120 men who would certainly do their work more efficiently were they given training of the university standard. If we allow for the drafting of men to the scientific sections and for the training of men to fill posts in the college itself, probably a total of 150 men would be a modest estimate. If we allow an average period of service of twenty years we should have to replace 7 men per annum. We have, in addition, the needs of the Education Department for men to develop agricultural instruction in middle and high schools. The demand in this direction might become very great indeed. However, the need in this direction would be chiefly for men who have had one year's training. We might possibly estimate the requirements of the Educational Department for agricultural graduates at two or three men per annum.

There is also the question of employing agricultural graduates in other departments of Government such as the revenue and co-operative departments and their utilization in connection with the development of such large irrigation schemes as that under the Irwin Canal. I believe that in all these spheres, the employment of a number of agricultural graduates would be highly desirable but it must not be forgotten that here they would be competing with the arts and science graduates of the University and to a lesser extent with engineering graduates also. Added to this, we have the fact that the training of agricultural graduates is certain to be more expensive than that of any of the others mentioned with the possible exception of the engineering graduates.

Lastly, there are the openings for agricultural graduates with large fertilizer companies, with land-holders and in the cultivation of their own lands. It is hard to gauge the requirements of fertilizer companies for the future. I personally anticipate a fairly rapid increase in the use of artificial fertilizers, so the prospects of regular employment in this connection are, I think, moderately good. As regards the demand for managers of estates the scope for employment

in this direction is not likely ever to be large in Mysore. As regards the prospects of agricultural graduates as managers of their own estates, while I believe that we shall see a considerable development in this direction during the next fifteen or twenty years, the fact remains that only comparatively few large land-holders in the State at present realize the necessity of having their sons trained in agriculture. If the policy of forming agricultural colonies is accepted and pursued, as I believe it should be, we shall have taken a very distinct step towards the utilization of the brains of the country in connection with agricultural development.

Taking everything into consideration, I believe the time is now ripe for considering the organization of an agricultural faculty in the University. The Re-organization Committee of the University Senate have made certain proposals in this regard. These proposals involve a two years' intermediate course in science which would be given in the Central College, Bangalore, followed by a three years' course in an agricultural college affiliated to the University. Successful completion of this course would entitle the student to a diploma in agriculture. While I have little criticism to make of the scheme as a whole I am very strongly of opinion that a course extending over a total of five years would warrant the granting of a degree of B.Sc. in Agriculture which should be considered as the equivalent, for Government employment, of the regular B.Sc. of the University. I may point out that in the case of Madras, the agricultural degree granted is after a course of this length with the same entrance qualifications; while in Bombay, the Punjab and the Central Provinces the degree is granted under less severe conditions. The Royal Commission are also of the opinion that a course of the nature suggested is quite sufficient to meet the requirements for a degree in agriculture.

As regards the curriculum of the agricultural college, the Commission strongly emphasize the need of a study of the business aspect of agriculture and consider that the subject of agricultural economics should occupy a much more prominent place than it now generally does. In all the agricultural colleges of India with the exception of Poona where a chair of agricultural economics has been established, this subject is dealt with by the professor of agriculture. The Commission rightly consider that questions relating to production and marketing are likely to assume a steadily increasing importance in

India. The subjects of farm management and farm accounts are ones that demand greater attention than they now receive. The Commission consider that more thorough training in these subjects can best be supplied through a supplementary practical course on a government farm or private estate after graduation. As a matter of fact it is an established practice in Mysore to give all agricultural inspectors a year's training on one of our farms before they are sent out for district work.

The question of instituting a short course of two years similar to that already existing at Lyallpur, Cawnpore and Nagpur should, I think, not concern us in the immediate future. If a demand arises for the institution of a course specifically to fit men for managing their own estates, the question will have to be considered. The provision of a regular three years' course and of a one year's course for teachers will, I believe, fully occupy the attention of the staff that can be provided for the college for a number of years to come.

The Commission attach great importance to the establishment of short courses of a few weeks' duration at agricultural colleges for the benefit of the cultivators, and consider that the colleges should accept responsibility for creating a demand for them. Such courses were instituted in connection with the Hebbal School some years ago but had to be discontinued as there was no accommodation at Hebbal for housing ryots and others who desired to attend them. These courses had to do mainly with such subjects as the use of improved implements and improved methods of jaggery manufacture. Somewhat similar courses have been held at the Marthur Farm but here again the absence of suitable accommodation has been a heavy handicap. While there has been no marked demand on the part of ryots for these courses it seems possible that had we been able to conduct them regularly year after year a demand would have arisen. This is a question which should be taken into consideration in the future provision of buildings at the proposed college as well as on the experimental farms.

The important question of graduate training is dealt with last. Here the Commission propose the strengthening of the Pusa Research Institute so as to make it an adequate centre for research training for the whole of India. If this is done we should, no doubt, be able to

send our most promising men to the Institute instead of abroad as is at present done. While I should be averse to discontinuing entirely the granting of foreign scholarships, there is no doubt that India should become self-contained in the matter of provision for research training in agriculture.

CHAPTER XVI.

Rural Industries and Labour.

The expressed object of the discussions in this chapter is to consider how the villager can best use his spare time for the improvement of his position. It is pointed out at the beginning that, in the opinion of the Commission, the cultivator cannot be expected to be an expert in any thing but his own occupation. In other words there can, in general, be no satisfactory blending of two avocations. The cultivator must, therefore, occupy the place of an unskilled labourer if he takes to an industrial occupation unless he is prepared to undergo the training necessary to become skilled at some type of industrial work.

Elsewhere in their Report the Commission emphasize in general the fact that while the agriculturist has undoubtedly much spare time on his hands, the best way to utilize that spare time will probably not be in the taking up of a subsidiary occupation distinct from agriculture but in more intensive cultivation which may be made possible through the improvement of irrigation facilities and in community work for the improvement of village conditions in general. I am in entire agreement with this view.

The kinds of subsidiary employment of an industrial character which may be open to agriculturists in their spare time are the following:—(a) employment as unskilled labour in local factories such as rice mills, oil crushing factories, sugar factories and cotton ginneries, (b) employment as casual labour in brick-making and the making of roads; (c) employment in village industries such as weaving, silk-reeling, jaggery manufacture, extraction of oil in village presses; and (d) sale of his labour during periods of idleness to factories at a distance.

I am not in a position to state to what extent agriculturists in Mysore are being employed in local factories of the kinds mentioned above or even in village industries. There must, however, have been

a considerable increase in recent years as the number of these local factories has undoubtedly grown. With the increase of factories undoubtedly there will be an increased demand for the labour of our agriculturists but in Mysore at least there is little evidence of movement of agriculturists over long distances.

The Commission make a few specific suggestions with regard to employment of agriculturists in industrial occupations. The first of these is the manufacture of agricultural implements. They suggest that the demand that is likely to arise for improved agricultural implements will warrant the establishment of many more manufacturing establishments than at present exist. They suggest that if young men with agricultural experience receive engineering training they should be particularly well equipped for taking up the manufacture of these implements.

While I agree that an agricultural background would be of great advantage to manufacturers of agricultural implements, I believe that these implements can be turned out most economically from large factories and that only in this way can uniformity of material be assured. There is a certain amount of local manufacture of improved ploughs in the Mysore State at present but I have seen little evidence that these local makers can compete with larger and more fully equipped factories. I personally consider that it is more important to supply to agriculturists implements of uniformly good quality and design at the cheapest rate possible than to encourage a number of local manufacturers to take up the business with the probable result that uniformity and quality of product would suffer. Other industries which it is suggested might be taken up are paper manufacture, oil seed crushing and bone crushing. Of these I believe the second only has any prospect of development in Mysore.

As regards typical village industries the Commission discuss hand-loom weaving, pottery manufacture, rope making, sericulture and poultry raising.

With regard to the first four, I should prefer to leave to the Director of Industries a discussion of the possibilities of their development as sources of subsidiary occupation for agriculturists. With regard to the last I believe a good deal of careful experiment is required before we can decide as to the feasibility of attempting to

place poultry raising on a higher basis than it is at present. I am personally somewhat sceptical of the prospects.

Lac cultivation is another subsidiary industry dealt with by the Commission but as I know very little about its possibilities in the State I would suggest that the views of the Chief Conservator of Forests be obtained in the matter. I have not discussed the question of sericulture because in Mysore it must be looked upon as a major agricultural industry.

The possibilities of developing fruit and vegetable production is dealt with in a separate chapter. The general conclusion of the Commission as to the possibilities of developing rural industries to give employment to agriculturists are as follows :—

“ But even with the aid of new ideas and assistance in training and marketing, the contribution which rural industries can make in reducing the heavy pressure on the land is infinitesimal and in the nature of things they cannot, as a rule, hope forever to survive the increasing competition of organized industry. In some cases, we are afraid that an altogether exaggerated importance is attached to their development whereas sound reflection would show that their possible expansion is strictly limited. The position may be summed up as follows :—In villages generally, some increase in demand for local products may be looked for as new ideas of the values of life develop. In villages favourably situated for the establishment of small industries such as rice and sugar mills, cotton ginneries and presses, part of the agricultural population may find seasonal work as unskilled labourers. In the villages, many of the smaller cultivators find employment in carting for their more prosperous neighbours and some may hire out their own labour to them. Where caste prejudices are not a difficulty, a few may find employment as assistants to the local artisans. Near large towns poultry can be kept or vegetables, fruit and flowers can be cultivated. The women and girls of the family can fill their leisure moments with the spinning of various fibres and also with the making of lace and embroidery, a cottage industry to which the Madras Department of Industries has paid special attention. In certain areas, lac cultivation and silk can be taken up and near forests employment can be obtained by the cultivators in their spare time in various ways. But the possibility of spare-time or subsidiary occupations depends very largely on the location of the

village and, as a general principle, it may be laid down that the chief solution of the problems of the cultivator is intensification or diversification of his agriculture. Corporate action for the improvement of his village would, of course, give him something to do ; but this awaits the awakening of a public health conscience and the revival of the corporate spirit in the village. To put it briefly, the possibilities of improving the conditions of the rural population by the establishment of rural industries are extremely limited."

The Commission next discuss the sale of labour surplus and point out that as local industries grow the demand will increase. There is in other parts of India which contain large industrial centres a considerable movement of agricultural labour to these centres. In Mysore we have no large industrial centre and while the Mysore Iron Works and the cotton mills of Bangalore and Mysore must absorb a certain amount of labour in the slack agricultural seasons, this cannot greatly affect the problem here.

As regards the movement of agriculturists for the purpose of working on plantations, this undoubtedly plays an important part in providing a means of livelihood for our surplus agricultural labour. Unfortunately such work clashes to a certain extent with that on the ryots' own fields but still there is quite a considerable movement to tea and coffee estates both inside and outside the State. Conversation with planters, in general, leads me to believe that the demand is greater than the supply and the United Planters' Association of Southern India employs a number of agents in the State to recruit labour for those who are members of the association. The reputation of the Mysore agriculturists as labourers on estates is excellent. The fact that they are not now obtainable in numbers nearly as great as they used to be indicates, I think, clearly that the economic condition of the ryot is improving.

The question of the advisability of restricting emigration of labour from India or of the conditions on which such emigration should be allowed, is of only indirect interest to us in Mysore. As far as I am aware there is no emigration of Mysore people to foreign countries.

CHAPTER XVII.

Horticulture and Plantations.

The Commission recognize that there are, in the aggregate, considerable areas devoted to fruit and vegetables which are not taken

into account in the statistical reports on agriculture. There are thus the back yards, the small strips between fields cultivated with crops and patches under wells where both fruits and vegetables are grown for home consumption.

The chapter is concerned largely with the possibilities of fruit and vegetable culture for sale. The chief essentials for the intensive cultivation required for these crops are a rich and deep soil, plenty of manure and an assured and controlled water supply with, I might add, facilities for drainage. The chief obstacles which have stood in the way of an extension of fruit cultivation in India, outside of those produced by the soil and climatic conditions, are the following :—(a) lack of horticultural tradition, (b) the amount of capital required and the time it requires to bring the crop into bearing, (c) lack of expert advice, (d) difficulty of obtaining suitable varieties, (e) lack of transport facilities, and (f) difficulty of marketing.

The Commission point out that an expansion of fruit cultivation must largely depend upon the development of home markets and further emphasize the danger of glutting the market in years of large production. They suggest the advisability of trials of both canning and drying as a means of utilizing surplus fruit but recommend that only one or two lines be tried in the first instance.

As to vegetables the evidence they collected indicated that there has been a growth in the demand for high class vegetables. They consider here, as in the case of fruits, an investigation of home markets is desirable and that the prospects of market gardening are more hopeful than those of fruit culture.

In regard to the relation of agricultural departments to horticulture it may be noted that throughout British India the work of developing horticulture has, as a matter of course, been entrusted to the agricultural department. It is only recently, however, that horticultural work has been taken up seriously. The Punjab Government have two fruit specialists and are appointing a vegetable specialist. Horticulture in the United Provinces has been in the charge of a deputy director since 1922 and training in horticulture is to be given in the Cawnpore Agricultural College. Similar developments are contemplated in other provinces as well.

The Commission indicate that there is important research work to be done notably in selecting and classifying suitable root stocks for

fruit trees. Finally they point out that a study of markets, present and prospective, is particularly important in connection with any scheme for the expansion of fruit and vegetable cultivation.

Turning to Mysore we find, on the whole, conditions very similar to those in British India. Our climatic conditions are, on the whole, favourable for fruit cultivation although our soils are not particularly rich. We are undoubtedly heavily handicapped by the distance from very large markets. At present, with the exception of mangoes which are shipped out of the State in considerable quantities, practically all our fruits find a home market.

The total area under fruits in the State is not known ; the only figures we have are for mango of which there are about 10,000 acres in the State. If we exclude plantains, it is doubtful if all the rest of our fruits cover an area of more than 5,000 acres which would give a total area of 15,000 acres under fruits in the State. This is approximately one four-hundredth of the total area under cultivation.

Turning to vegetables the only crops that are given separately are potatoes (9,695 acres in 1926-27) and onions (7,941 acres in 1926-27). Other crops such as coriander and chillies are grown largely as field crops in Mysore and hardly come under the definition of vegetables. The total area under market gardening can, I believe, not exceed 50,000 acres in Mysore and so represents about one hundred and twentieth of our total area.

The work of improving horticulture in Mysore is under a separate Department of Horticulture. I am personally of opinion that this is a wasteful arrangement. Horticulture is really a branch of agriculture and co-ordination of activities would, I am convinced, lead to more real progress. The services which could be rendered towards horticultural improvement through the highly trained staff and the well-equipped laboratories of the Agricultural Department are at present not being utilized owing to this lack of co-ordination. The organization of a separate horticultural school in which the fundamental instruction must be the same as in an agricultural school is an instance of division of effort which, considering the insufficiency of funds that can be devoted to agricultural development, is, I believe, not warranted.

The investigation of markets in connection with fruit cultivation is, I believe, an important subject in Mysore. Owing to large profits

that have been made by individual growers of fruits more particularly apples, there has been a considerable movement towards the planting of orchards, more especially near Bangalore. While I am not prepared to say that a profitable market will not be found for all the fruit that is likely to be produced from the orchards already planted, I should like to refer to the experience of Canada and the United States where some years ago there was a rapid expansion of fruit cultivation leading to a glut of the market and unprofitable prices to the growers. I should like to emphasize that where an agriculturist is considering the investment of large sums of money in a perennial crop such as our fruit crops are, he should consider what the probable state of the market will be five or ten years from now. The fact that large profits are now being made from the comparatively small areas planted to fruit trees in this State is no guarantee that similar or even profitable prices will rule if there is a rapid expansion to ten times the present area. I would strongly urge the necessity of a careful study of markets in connection with efforts to expand fruit cultivation in the State.

The question of plantation crops such as tea, coffee, rubber and cardamoms is dealt with very briefly in this chapter and need not detain us. Our main plantation industry is coffee and the organization that has been created for research in connection with this crop and the one that has been recently proposed to Government for demonstration and propaganda work throughout the coffee-growing area, will, I believe, lead to very decided progress in the near future.

CHAPTER XVIII.

Statistics.

With much of the discussion contained in this chapter we are only indirectly concerned as it deals with all-India statistics. It is noted that there still exist considerable differences between the collection of statistics in various provinces but I believe we are, in Mysore, following what is the general practice in India and are providing for the all-India publications information on approved lines.

The main Indian statistics are those published annually in the "Agricultural Statistics of India" of which Volume II is devoted to Indian States. The information given there includes total area, classified as cultivated (or sown and current fallows), uncultivated

(culturable waste and area not available for cultivation) and forests ; area and crops irrigated ; total area under crops and under each important crop ; numbers of live-stock, ploughs and carts ; the incidence of assessment on land ; harvest prices of important crops and average yield of principal crops in each province. The Commission consider that the period elapsing between the end of the year and the date of publication (eighteen months) is too long and that the practice of giving statistics by districts which was abandoned after 1920-21 should be restored.

Other all-India publications are (a) the Quinquennial Report on Average Yield per Acre for seventeen important crops, and (b) the statistics contained in the *Indian Trade Journal*.

In addition to these there are crop forecasts which are published for eleven crops and also the annual 'Estimates of Area and Yield of the Principal Crops in India'. Other sources of statistical information are the annual reports of the various departments of agriculture, the annual review of agricultural operations, the publications of the Indian Central Cotton Committee and the reports of the irrigation and forest departments and the annual review on irrigation in India.

A suggestion is made that the area under wells in the provincial reports on irrigation should be classified under three heads : (a) area under wells in use, (b) area under wells in working order but not used, and (c) area under abandoned wells. I am inclined to think that this information would be hard to collect and that the results obtained would not be commensurate with the expense and trouble involved. A further suggestion is that a more detailed classification of the forest area indicating the total area actually under forests would be advantageous.

The Commission also consider vital statistics, a question upon which I do not propose to touch. In another connection reference has been made to the very imperfect mortality returns for live-stock but as these figures though submitted to Government are not published, it need not concern us here.

In regard to the character of the information furnished the Commission are of opinion that the returns for area under crops are fairly accurate at least as regards the more important ones. They criticise, however, the classification of uncultivated land into 'cultivable waste other than fallow' and 'land not available for cultivation'. They

consider these areas should be re-examined to ascertain to what extent they are related to the actual facts. In their opinion a considerable portion of the area given as culturable waste is really unsuitable for cultivation. However, as is well known, the margin of cultivation is shifting and I am personally doubtful if much valuable information would be obtained from such an enquiry.

As stated, the crops as returned by the village officials are considered generally to be fairly accurate. With this I agree. However, here as in connection with the statistics of outturn, there is undoubtedly, in Mysore at least, very little critical study of the statistics collected and I have yet to see a *Season and Crop Report* in which one who had even an elementary knowledge of local agricultural conditions could not find either glaring errors or at least figures so doubtful as to demand tracing back to their sources. I shall not here go into the questions of 'normal yield' and 'condition estimates' but should like to emphasize what is emphasized in this chapter and has been repeatedly stressed by the Board of Agriculture in India. That is the fact that unless and until there is a statistical section in the Agricultural Department which can study critically the figures collected, we cannot hope to see our *Season and Crop Report* what it should be. A recommendation in this connection was made as long ago as 1915 by a Special Committee appointed to go into the question of agricultural statistics. This Committee reported as follows :—

“ As to the question of agency for collecting and publishing agricultural statistics we propose that the duty of compilation should be transferred to the Department of Agriculture. This change would be logical and fitting and would bring the practice in this country more into line with what exists elsewhere under modern conditions, while it would enable the Agricultural Department to maintain a close and constant watch over the vicissitudes of agriculture.

“ In order to effect this change, the statistical staff employed in the offices of the Revenue Commissioner and the Director of Agriculture should be amalgamated and placed under the latter who should further be given the assistance of a trained ministerial assistant on a pay of Rs. 100 or Rs. 150 per mensem. The amalgamation may render a few clerical hands superfluous in which case the savings obtained by dispensing with them may go some way in providing for the pay of

the trained hand proposed to be employed. But whether this will be so or not, we consider that if statistics are to be kept correctly and on sound lines, at least one official with an aptitude for figures and a knowledge of statistical methods is necessary in the central office. There would, we conceive, be little difficulty in securing a man of the kind contemplated. An intelligent official who has studied mathematics may be chosen and got trained in the offices of the Director of Statistics and Director of Commercial Intelligence with the Government of India."

No effective action has as yet been taken by Government on that recommendation. We have heard much in Mysore of recent years in regard to the necessity of having statistical estimates of progress made from time to time. I should like to emphasize that unless and until we are able to submit the basal figures of our agricultural statistics to a critical study, any advantage to be gained from the preparation and publication of such estimates would be largely illusory. The one real lesson for us in Mysore from the chapter under review is the necessity of establishing in the Agricultural Department a statistical section to deal with the study, compilation and publication of all agricultural statistics in the State.

CHAPTER XX.

Miscellaneous.

This chapter deals with questions such as the development of agriculture in minor provinces, education in the principles of local self-government, meteorology and agriculture and the relationship between Indian Agricultural Departments and the International Institute of Agriculture at Rome and the Imperial Institute in London. These questions have comparatively little interest to us, so I shall not discuss them.

There is, however, one question discussed in this chapter which has definite reference to Indian States and so should interest us particularly. The Commission point out that though their terms of reference forced them to limit their enquiry to British India, the great importance of Indian States from the point of area and their essentially agricultural character has compelled occasional reference to them.

They point out that the desirability of co-operation with Indian States has already been recognized in the constitution of the Indian

Central Cotton Committee and of the Board of Agriculture on both of which Mysore is represented. They add :—" We have no doubt that the manner in which co-operation can be rendered more effective and more especially, the manner in which the Indian States can best be brought into the research organization, the establishment of which we suggest in Chapter III will receive early and careful consideration from the Government of India and the Rulers of the States. We are confident that it will become increasingly practicable to envisage the agricultural and veterinary problems of India as a whole and to initiate measures for their solution which will be operative in all parts of the country."

I agree most heartily with the views expressed in this quotation. The relations between the departments of agriculture in British India and that of Mysore have always been of a cordial and helpful character. I should like to point out, however, that future relations must be on a basis of equality with the various provinces as far as an effective voice in the all-India organizations that have been or are to be created, is concerned. I believe that the place Mysore has occupied in the development of agriculture in India demands nothing less than this.

**Summary of the main Proposals made and Conclusions
reached in the accompanying Note.**

CHAPTER III.

ORGANIZATION OF AGRICULTURAL RESEARCH.

(1) The association of the University with the Agricultural Department in the investigation of important problems connected with agriculture is a question worthy of serious consideration. For proposals connected with this, see pages 3—6.

CHAPTER IV.

1. The co-operation of the Geological Department with the Agricultural Department in the preparation of a combined report on geology and soils is suggested. Page 7.

2. The potential importance of commercial fertilizers in the increase of crop yields in the State is emphasized. Page 10.

3. The establishment of a special section to deal with the testing and distribution of new varieties of crops is recommended. The Government of Mysore have already sanctioned proposals in this connection. Page 13.

4. The importance of developing the agricultural engineering section of the Department to deal with the important question of designing and adapting agricultural implements for our conditions is emphasized. Pages 13—14.

5. The development of a section to deal with the sinking of irrigation wells and with lift irrigation in general is discussed. Page 15.

6. The possibility of close association between the Department of Industries and Commerce and the Agricultural Department in both these lines of work is considered. Page 15.

CHAPTER V.

SUB-DIVISION AND FRAGMENTATION OF HOLDINGS.

1. Before any action is taken towards the consolidation of holdings a survey of selected villages should be made. This work might be carried out according to a definite plan by district economic superintendents, agricultural inspectors and co-operative inspectors. Page 19.

2. The organization of such a survey might be considered as one of the functions of a Board of Economic Enquiry. Page 19.

CHAPTER VI.

DEMONSTRATION AND PROPAGANDA.

1. The work of demonstration and propaganda in the districts should, as far as possible, be co-ordinated by the economic committee of the district board which should include in its membership representatives of the development departments. This would necessitate an association of the district board in the development of village panchayats. Page 28.

CHAPTER VII.

LIVE-STOCK.

1. Experiments should be made on the utilization of *gomal* lands for the production of fodder. Page 38.

2. The most important work in connection with the improvement of cattle is the organization of breeding on sound scientific

lines and on a sufficient scale to supply 200 breeding bulls per annum. A scheme for the establishment of a breeding station to meet this need has since been sanctioned by Government. Pages 41—44.

CHAPTER VIII.

FORESTS.

1. Experiments on rotational grazing in forest areas which are already planned should be carried out. Page 50.

2. Afforestation of waste lands is a necessary step towards the provision of adequate supplies of fuel and wood for agriculturists. Pages 51—54.

CHAPTER IX.

DISEASES OF LIVE-STOCK.

1. The strengthening of the veterinary staff is necessary for the more adequate control of cattle diseases. Pages 56—59.

2. The Serum Institute should be enlarged and developed to meet our needs for sera and vaccines for our important cattle diseases. It would lead to economy and efficiency if it could be organized as a branch of a central Institute of Public Health for human beings and animals. Pages 59—60.

CHAPTER X.

IRRIGATION.

1. The development of well irrigation is very urgent and a special organization should be created for the purpose. Pages 66—68.

2. An agricultural survey should precede all large irrigation schemes and the Agricultural Department should be associated with the development of such schemes. Pages 69—70.

CHAPTER XI.

COMMUNICATIONS AND MARKETING.

1. Prior to considering the question of the establishment of controlled markets for agricultural produce, a market survey should be instituted. Pages 71—75.

2. The organization of such a survey should be one of the functions of a special Board of Economic Enquiry. Page 76.

CHAPTER XII.

FINANCE OF AGRICULTURE.

1. A closer co-operation between the Revenue Department and the Agricultural Department should exist in connection with the granting of agricultural loans. Page 82.

CHAPTER XIII.

1. There should be an increased utilization of co-operative societies in connection with agricultural development. This can be brought about by a close association of the two departments concerned. Page 86.

CHAPTER XIV.

THE VILLAGES.

1. The advisability of the establishment of a central Public Health Institute should be considered. Pages 92—93.

2. Under existing conditions it seems advisable to utilize the existing agencies of district boards and village panchayats in the work of village uplift rather than to create special organizations for the purpose. Page 93.

CHAPTER XV.

EDUCATION.

1. The organization of special vernacular agricultural schools should be taken up with great caution. Page 98.

2. There should be a closer association between the Education Department and the Agricultural Department in the development of agricultural education in middle schools. Pages 100—101.

3. The question of the organization of an agricultural faculty in the University should be considered early. Page 106.

CHAPTER XVI.

RURAL INDUSTRIES AND LABOUR.

1. There does not seem to be very great scope for the introduction of special subsidiary industries for agriculturists. More promising lines of effort appear to be (a) intensification of agricultural production through education and the provision of more adequate

irrigation facilities, and (b) corporate action for the improvement of village conditions. Page 103.

CHAPTER XVII.

HORTICULTURE AND PLANTATIONS.

1. The present arrangement whereby horticultural propaganda, experiment and instruction is carried out by a separate department is wasteful. Page 13.

2. A careful consideration of markets and transport facilities is necessary in connection with any scheme for horticultural expansion. Page 14.

CHAPTER XVIII.

STATISTICS.

1. The organization of a statistical section in the Agricultural Department for the critical study and compilation of our agricultural statistics is the first step to be taken towards their improvement. Page 117.

CHAPTER XX.

1. The future relations between the departments of agriculture in British India and in the Mysore State must be on a basis of equality as far as an effective voice in the All-India organizations, present or prospective, is concerned. Page 118.