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REPORT
OF THE
AGRICULTURAL
PERSONNEL COMMITTEE
OF THE
PLANNING COMMISSION



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PLANNING COMMISSION

MARCH 1958

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CHAPTER I

INTRODUCTORY

In March, 1957, the Planning Commission felt it necessary to make a fresh assessment of requirements for trained personnel in the agricultural sector during the Second and Third Plan periods, as well as of arrangements for the training of such personnel. The Planning Commission accordingly set up a Committee on Agricultural Personnel, under the Government of India, Planning Commission, Resolution No. P.C. (IV)5(II)4/57, dated the 18th March, 1957, (Appendix I), with the following as members:—

Chairman

- (1) Shri P. N. Thapar, I.C.S.,
Secretary,
Department of Agriculture,
Ministry of Food and Agriculture.

Members

- (2) Shri B. R. Tandan, I.C.S.,
Secretary,
Ministry of Community Development.
- (3) Sardar Nawab Singh, I.C.S.,
Adviser,
Programme Administration,
Planning Commission.
- (4) Dr. M. S. Randhawa, I.C.S.,
Vice-President,
Indian Council of Agricultural Research.
- (5) Shri L. P. Singh, I.C.S.,
Director,
Directorate of Manpower,
Ministry of Home Affairs.
- (6) Shri G. G. Takle, I.F.S.,
Inspector General of Forests.
- (7) Dr. B. N. Uppal,
Agricultural Commissioner.
- (8) Dr. L. Sahay,
Animal Husbandry Commissioner.
- (9) Dr. L. C. Sikka,
Dairy Development Adviser,
Department of Agriculture,
Ministry of Food and Agriculture.
- (10) Dr. J. S. Patel,
Agricultural Adviser,
Ministry of Community Development.
- (11) Shri Pitambar Pant,
Scientific and Technical Manpower Division,
Planning Commission.

Member-Secretary

- (12) Shri J. V. A. Nehemiah,
Secretary,
Indian Council of Agricultural Research.

2. The terms of reference of the Committee were as follows:—

- (i) to examine the present position in regard to the supply of trained technical, scientific and administrative personnel, with special reference to existing or expected shortage;
- (ii) to make a fresh assessment of requirements for trained personnel during the Second and Third Five Year Plans, keeping in view the increased targets of agricultural production and the long-term proposals of development in different fields;
- (iii) to review the present programmes for the expansion of training facilities and the progress made in their implementation;
- (iv) to recommend measures for augmenting training facilities and to formulate a phased programme for giving effect to them; and
- (v) to make such other proposals as may be considered necessary.

3. In chapter II we have indicated the scope of the enquiry and our broad approach to the problem. The chapter also sets forth the assumptions made by the Committee for estimating the requirements of the Third Plan.

In the light of the guidance thus furnished by the Committee, the various scientific and technical Advisers of the Ministry of Food and Agriculture prepared papers on the all-India requirements during the Third Plan period in their respective fields of work. These papers were discussed thoroughly at full sessions of the Committee which laid down the lines on which its recommendations were to be drafted. These drafts were prepared in the form of chapters covering each subject under review and further discussed by the Committee. The drafts were forwarded to the State Governments also for their suggestions on the Committee's approach to the problem. The replies received from the State Governments were considered and wherever found necessary, their suggestions were incorporated. In general, the State Governments agreed with the approach of the Committee. The report as finalized by the Committee is now submitted to the Planning Commission.

4. We have to thank the State Governments for furnishing replies promptly to a questionnaire (*Appendix I-A*) issued by the Committee and for providing facilities for conducting studies in the State Secretariat to check the data collected through the questionnaire. We have to thank the Central Ministries also for furnishing information on some of the queries of the Committee. We have pleasure in recording our appreciation of the co-operation we received from the Principals of Agricultural and Veterinary Colleges in India who furnished valuable material on the existing training facilities.

5. We are very much indebted to the different Advisers of the Department of Agriculture in the Ministry of Food and Agriculture who helped the Committee at all important stages and who prepared papers and drafts for the consideration of the Committee.

6. We are particularly grateful to Shri Pitambar Pant of the Planning Commission, who had conducted a preliminary study of the training and employment of agricultural graduates in India and submitted a report entitled "Manpower Studies" which had given the Committee valuable background material. He took great interest in the preparation and presentation of the statistical data also.

7. Our thanks are also due to Shri R. Prasad of the Manpower Directorate of the Ministry of Home Affairs for the material and advice he placed at our disposal. His recent but long experience of handling agricultural problems in a large State like Bihar was of special benefit to the Committee.

8. We must also mention the name of Shri J. V. A. Nehemiah, Member-Secretary, who had to organise and execute the entire work. It would not have been possible for the Committee to cover such a wide field without his promptness and efficiency. We desire also to place on record our appreciation of the services rendered by Shri R. Vengu, Under Secretary in the Department of Agriculture, who was attached to our Secretariat and helped materially in the collection of material and drafting of the Report. We would also like to mention the assistance given by Shri Daroga Singh, Research Officer, who was responsible for collecting and analysing the data about manpower availability and training facilities. Shri K. S. Mathew, Section Officer and Sarvashri Bhatnagar and Mahendra Nath, Investigators, and other members of the staff who assisted us, also did useful work.

CHAPTER II

SCOPE OF ENQUIRY AND APPROACH

Subjects dealt with and categories of personnel covered

2.1 We have reviewed the position with regard to the demand and supply of trained agricultural personnel during the remaining part of the Second Plan period, and attempted an assessment of requirements in the Third Plan period. Our survey covers all categories of trained personnel required for the programmes of development, Extension, research and education in the entire agricultural sector, including crop husbandry and horticulture, animal husbandry, veterinary science, dairying, fisheries, forestry, soil conservation, agricultural engineering, plant protection, co-operation, agricultural marketing, agricultural statistics and agricultural economics. Categories such as Ministerial staff, for which scientific or professional training in agriculture or allied subjects is not needed, have been left out of consideration, and certain types of sub-professional training have also not been covered.

Assessment of requirements has been made separately for (a) superior key personnel, (b) senior posts for which post-graduate training in some branch of science or in agriculture would ordinarily be necessary, (c) junior posts for which graduates in agriculture, veterinary science or allied subjects would be required, and (d) subordinate posts for which the basic qualification would be lower than a degree, but for which specialised training in agriculture or an allied branch of science would be necessary.

2.2 We should like to make it clear that our assessment of requirements takes into consideration only the demand for trained personnel for the execution of what may be called the Governmental and semi-Governmental programmes in the agricultural sector. Except in a few subjects like marketing, agricultural engineering, and agricultural economics, the requirements of the private sector have not been included. Our gigantic agricultural labour force, which numbered approximately 99 millions at the 1951 census would also, no doubt, require training if we are to bring about an abiding improvement in agriculture. Considering the size of the problem, we have, in the present circumstances, to depend largely on the Extension organisation to perform this task, but, with the progress of time, there would also be need for providing institutional training in agriculture to the large number of agricultural entrepreneurs and leaders. The training programme which we have recommended does not cover this requirement, the question of expansion of training facilities at appropriate levels for this purpose will have to be considered at a later stage.

We would, however, observe, in passing that practically every cadre would need to have adequate training and deputation reserves if in-service training is to be provided on the requisite scale; and in not taking the need for these reserves into account in all cases our estimates incline on the conservative side.

2.3 Under our terms of reference, we are required to make recommendations for developing all forms of training facilities, including institutional training and in-service and refresher training. Though some recommendations have been made in this report for provision of *ad hoc*, in-service and refresher training for certain categories of staff, we have concentrated our attention mainly on the question of development of facilities for

regular institutional training. The establishment of such institutions usually involves a considerable amount of preliminary planning, and consequently, time; and it takes a minimum of three to four years to complete the training course. The planning of such courses, has, therefore, to be done at least five to six years in advance if future development is not to be hampered or held up for want of trained personnel. We fully realise that in-service and refresher courses have very considerable importance, particularly in the context of establishment of the National Extension Organisation; but such courses have to be adjusted from time to time to fit in with specific development programmes that may be undertaken; and, moreover, training centres for providing such courses can be organised in a comparatively short time.

Approach with regard to Third Plan requirements

2.4 The assessment of requirements in the Third Plan period was beset with difficulties. It was too early to expect any indication of the scope and size of the Third Plan, or of the resources that would be available for development in the agricultural sector, and of the order of priorities within the agricultural sector itself, say, as between crop husbandry and horticulture or animal husbandry. The number of trained personnel required under different categories would also depend on the pattern of staffing that may be evolved in due course for different types of work, and, to some extent, on the nature of the schemes that may be undertaken by the State Governments, taking into consideration, among other things, local conditions and needs. As the training of technical and professional personnel, particularly for the higher grades, takes a long time, it is, unavoidable that manpower planning should be done well ahead of the preparation of specific plans or programmes of development.

In making our assessment of requirement of trained agricultural personnel, we have proceeded on the assumption that even as a minimum programme, it will be necessary to provide for continuing annual expansion of agricultural production at the rate of about five per cent in the Third Plan period. The grounds for this assumption may be briefly stated.

Agriculture contributes nearly half of India's national income, and out of total population of 361 millions in 1951, 249 millions, or, approximately 70 per cent, were found to be dependent for their livelihood on agriculture. Though the pace of industrial development has become accelerated in the Second Plan, the shift of population from agriculture to industries is not likely to be appreciable during the Third Plan. There are indications of a significant fall in the death-rate, but there is little evidence of any decline in the birth-rate, with the result that our population continues to grow at a high rate. This trend is likely to continue in the Third Plan period. The economic development of the country and the raising of the standard of living of the common man will thus depend to very large extent on our success in developing agricultural production in the Third Plan period.

Taking 1949-50 as the base year, the production of foodgrains in the country increased on an average by 2 to 3 per cent per year during the First Plan period, and of all agricultural commodities taken together by a little more than 3 per cent per year. The Second Plan originally provided for an increase of 15 per cent in the production of foodgrains over the estimated production during 1955-56; this was considered inadequate and the target was subsequently raised to 23.8 per cent. The Second Plan has thus a

CHAPTER III

AGRICULTURE

Forecast of Second Plan requirements in 1955

3.1. Though some steps had been taken to expand the facilities for agricultural education at the commencement of the First Five Year Plan, this was not based on a careful assessment of the requirements of trained agricultural staff, and by 1954 serious difficulties began to be experienced in some parts of the country owing to an acute shortage of agricultural graduates and other trained agricultural personnel. The requirements of agricultural graduates for implementation of the Second Plan schemes were roughly estimated in 1955 by the Ministry of Agriculture, in consultation with the Planning Commission on the basis of forecasts furnished by the State Governments, as about 6,500, broadly distributed as under :—

Replacements	..	..	700
Requirement of National			
Extension Service Blocks	..	..	3,800
Agricultural Research and			
Education, and Development			
schemes	..	..	2,000

The information supplied by State Governments was in many cases incomplete, and the details of many schemes which have been included in the Plan were not available at the time. This estimate also did not make any allowance for the requirement of agricultural graduates for multi-purpose schools and for posts in which a degree in agriculture is a preferential qualification.

Measures taken to expand training facilities

3.2 The annual output of agricultural graduates was about 900 in 1955 and urgent steps had to be taken for expansion of facilities for agricultural education. Six new agricultural colleges were set up, one each in Kerala, Rajasthan, Orissa and Bihar, and two in Madhya Pradesh; the Government Agricultural College, Punjab, was rehabilitated; and existing colleges in Madras, Assam, Andhra Pradesh and Madhya Pradesh were expanded. Admissions to agricultural colleges increased from about 1,250 in 1953-54 to about 2,660 in 1957-58 (*see* Table 1) as a result of these measures.

Issue of Questionnaire

3.3 As the estimate prepared in 1955 was of a provisional character, and there have been many developments since, we decided to issue a questionnaire to State Governments, Central Departments and training institutions to obtain a complete and up-to-date picture. Information was thus sought regarding the number of posts sanctioned and filled up in different categories till June, 1957, and the number of posts likely to be created during the remaining years of the Second Plan (1957-61), and the qualifications prescribed for different posts. Information was collected also about the number of admissions in and output of different agricultural colleges and schools.

target of stepping up foodgrains production at the average rate of roughly $4\frac{1}{2}$ per cent per year. The increase planned for all agricultural commodities is of the order of $5\frac{1}{2}$ per cent per year. The rate of increase in agricultural production, particularly foodgrains production, must be such as to take care of the growth in population (which may be expected to rise from the last decade's average of $1\frac{1}{4}$ per cent per year to more than $1\frac{1}{2}$ per cent per year in the next few years), meet the increase in demand on account of a rise in the *per capita* income, and help in building up stocks to cover shortages which may occur in lean years*. The stresses which developed in the first two years of the Second Plan due to shortages in agricultural production point unmistakably to a need for raising and maintaining food production at a fairly high level. Alongwith foodgrains production of commercial crops which provide raw material for our expanding industries, or are important as export commodities, will also have to be increased to keep pace with the requirements of our developing economy. The rate of growth in agricultural production planned for the Second Five Year Plan has not merely to be maintained, but somewhat stepped up and we have felt justified in assuming a target of increase in agricultural production at the rate of about 5 per cent per year during the Third Plan period.

The Second Plan has initiated development of horticulture, animal husbandry, dairying and fisheries with a view to diversifying farming, providing a more balanced diet to the people, and raising the income of the cultivating community. This development will need to be accelerated in the Third Plan period. India's dependence on bullocks for draught purposes, and the need for including more milk products in our diet, demand a vigorous cattle improvement programme. And this in turn requires increased production and improvement of cattle feed. Increasing attention has, therefore, to be given to proper land management, including crop rotations which would provide sufficient diversity to include production of leguminous fodder and forage crops in the cropping scheme. This will not only lead to increased milk production but will also bring about increased soil fertility and, in turn, improve crop yields. Agricultural credit will have to be provided on a much larger scale than is envisaged in the Second Plan for achievement of the higher production targets of the Third Plan. There will similarly be a need for strengthening the organisation for agricultural marketing and grading for a proper handling of the increased production of agricultural commodities. We also expect that the study of agricultural economics and farm management, so far neglected in this country, will receive special attention in the Third Plan period.

2.5. There is great scope for increasing agricultural production in the country. The average yield of paddy in India is of the order of 1,200 pounds per acre; in China, it is 2,400 pounds; in Japan 3,700 pounds. It is true, conditions in different countries are not identical; but even internal comparisons reveal wide divergence in yields. The yields obtained by the average cultivator in India are much lower, for instance, than those on Government farms and well-managed estates, or those of relatively small cultivators who distinguish themselves at crop competitions. With the fuller application of better technical and scientific methods there are good reasons

*According to the Foodgrains Enquiry Committee Report, the range of variation of foodgrains output has been of the order of seven per cent in abnormal years, and production generally falls below normal in about two years, of a cycle of between six to seven years.

to expect that our agricultural production could be raised much higher than the present level.

It must be realised, however, that a great deal of effort and organisation will be needed if we are to raise the level of our agricultural production and maintain it at a high level. We have reviewed the present set-up of research, education and Extension in agriculture, animal husbandry, and allied fields, and reached the conclusion that the trained personnel provided at present are inadequate, in both quality and numbers, and will need to be considerably strengthened at different levels if we are to achieve substantial results. While we have based our conclusions largely on a consideration of the conditions obtaining in our own country, we have also examined the set-up in a number of other countries such as Japan, China, U.K. and the Netherlands, and the broad conclusions we have reached, particularly in relation to the Extension organisation are, generally speaking, supported by the experience of other countries. A description of the arrangements in certain foreign countries is given in Appendix (II). An important conclusion that emerges from our study of the development of agriculture in other countries is that the need for highly trained personnel increases with the increase in the intensity of agriculture and the introduction of scientific methods of cultivation.

2.6 In making our assessment of requirements for expansion of training facilities, we have kept two considerations constantly before us, (1) the need for ensuring manpower preparedness in the Third Plan period, so that agricultural development programmes are not held up or hampered for want of trained personnel, and (2) practical difficulties in the way of rapid expansion of training facilities such as shortages of equipment and, what is more important, of well-qualified teachers. We have also kept in view the disadvantages of a too rapid expansion of permanent training facilities. We are convinced that the recommendations we are making for the development of training facilities are practicable, and that their implementation should not cause undue strain or difficulty. Also, so far as we can judge on the basis of the available data, the timely implementation of these recommendations will, more or less, ensure manpower preparedness in the agricultural sector during the Third Plan period, and failure to do so may create difficulties.

2.7 In the subsequent chapters, we have dealt separately with manpower requirements in each major field such as agriculture, animal husbandry, dairying, forestry, etc. The chapter on 'Agriculture' gives at one place the total number of agricultural graduates needed for all types of programmes.

Our broad conclusions and recommendations have been summarised at the end.

CHAPTER III

AGRICULTURE

Forecast of Second Plan requirements in 1955

3.1. Though some steps had been taken to expand the facilities for agricultural education at the commencement of the First Five Year Plan, this was not based on a careful assessment of the requirements of trained agricultural staff, and by 1954 serious difficulties began to be experienced in some parts of the country owing to an acute shortage of agricultural graduates and other trained agricultural personnel. The requirements of agricultural graduates for implementation of the Second Plan schemes were roughly estimated in 1955 by the Ministry of Agriculture, in consultation with the Planning Commission on the basis of forecasts furnished by the State Governments, as about 6,500, broadly distributed as under :—

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3.2 The annual output of agricultural graduates was about 900 in 1955 and urgent steps had to be taken for expansion of facilities for agricultural education. Six new agricultural colleges were set up, one each in Kerala, Rajasthan, Orissa and Bihar, and two in Madhya Pradesh; the Government Agricultural College, Punjab, was rehabilitated; and existing colleges in Madras, Assam, Andhra Pradesh and Madhya Pradesh were expanded. Admissions to agricultural colleges increased from about 1,250 in 1953-54 to about 2,660 in 1957-58 (*see* Table 1) as a result of these measures.

Issue of Questionnaire

3.3 As the estimate prepared in 1955 was of a provisional character, and there have been many developments since, we decided to issue a questionnaire to State Governments, Central Departments and training institutions to obtain a complete and up-to-date picture. Information was thus sought regarding the number of posts sanctioned and filled up in different categories till June, 1957, and the number of posts likely to be created during the remaining years of the Second Plan (1957-61), and the qualifications prescribed for different posts. Information was collected also about the number of admissions in and output of different agricultural colleges and schools.

Position as in June, 1957

3.4. From an analysis of the data thus collected, (*see* Table 2—5), it would appear that in June, 1957, there were 30,200 posts in the agricultural sector for which a degree in agriculture or some other branch of science or art had been laid down as an essential qualification. Of these there were 10,600 posts for which a degree in agriculture was considered to be an essential qualification, and 4,700 posts for which a degree in agriculture was a preferential qualification but graduates in other subjects were also eligible. For 4,200 other posts, graduates in agriculture were eligible but they did not enjoy any preference. For the remaining 10,700 posts, qualifications were needed in subjects other than agriculture, such as, Veterinary, Dairying, Botany, Zoology, etc. Out of 10,600 posts for which a degree in agriculture was an essential qualification, 9,000 had actually been filled by June, 1957, and 1,600 posts were vacant; out of 4,700 posts for which a degree in agriculture was a preferential qualification, 4,200 had been filled up. It is not known as to what proportion of persons appointed to the latter category of posts are agricultural graduates.

Estimated requirement of agricultural graduates during 1957—61

3.5 It is estimated that the requirement of agricultural graduates during the remaining years of the Second Plan (June 1957—March 1961) will be of the order of 8,900 (*see* Table 6-7). This includes provision for filling 6,900 posts for which a degree in agriculture is regarded as an essential qualification, and 2,000 posts for which degree in agriculture is only a preferential qualification (*see* Table 6-7). The requirement of agricultural graduates for multi-purpose high schools has not been included.

Output of agricultural graduates during 1957—61—anticipated shortage

3.6 The output of all agricultural colleges in India during 1957-61 is estimated as 6,100 (*see* Table 7) approximately. It is thus likely that there will be a shortage of about 2,800 agricultural graduates by the end of the Second Plan period. If only posts for which a degree in agriculture is regarded as an essential qualification, are taken into consideration, the shortage will be of the order of 800. To this should, however, be added the requirement of agricultural graduates for multi-purpose high schools, which may be placed as of the order of 500. The deficiency cannot be made good during the Second Plan period, as institutional training takes 3-4 years; but as the shortages will be spread over a large field, and a part of the demand may be met, at least temporarily, by utilising graduates in other sciences, no serious difficulties may be expected to arise.

We have also taken note of the fact that the Study Team on Community Projects and National Extension Service have recommended a slowing down of the N.E.S. Programme to some extent so that the entire country is covered by 1963 instead of by 1961 as provided in the Plan. If this recommendation is accepted by Government, the requirement of agricultural graduates for N.E.S. Block during the Second Plan period would be reduced by 1,900 and shortages, as estimated by us, will be correspondingly reduced.

Assessment of requirements of agricultural graduates during the Third Five Year Plan.

3.7 We have shown in chapter II that even as a minimum programme, it would be necessary to provide for continuing annual expansion of agri-

cultural production at the rate of about 5 per cent in the Third Plan period. This will, in our opinion, necessitate a considerable strengthening of the existing set-up for agricultural research and education, and Extension.

Need for development of agricultural research

3.8 By the end of 1961, or, in any case, by 1963, the entire country will have been covered by the National Extension Service which was started for the first time in 1953. For Extension to be fruitful, it is essential that there should be development of research on an adequate scale. We agree with the observation made in their report by the Joint Indo-American Team on Agricultural Research and Education which examined this question in 1955 that "the total research programme underway is inadequate to meet the needs and demands for improved agricultural materials and practices on Indian farms . . . and although the present development of the expanded extension programme has not yet reached the halfway point, there is evidence that the present agricultural research output is not up to the task of meeting the needs for new information". It would be clearly risky to permit inadequate or insufficiently tested recommendations to be passed on to the cultivator through the National Extension Service, for, it would shake the confidence of the villagers not only in the reliability of the information presented to them, but also in the value and efficacy of scientific methods in agriculture. Significant increase in agricultural production cannot be achieved in India by further extension of area under cultivation and there may even be some advantage in reducing the acreage. For increasing agricultural production we have to rely more and more on improving the efficiency of production by intensifying the application of scientific methods. Intensification of agriculture in turn will create its own problems which can be tackled only by developing agricultural research. The experience of other countries also shows that as farming becomes more and more intensive, problems, such as, insect pests and plant diseases, increase in complexity and volume and sustained research on an extensive scale is needed for solving them.

Post-graduate education and research in agriculture

3.9 For strengthening the research set-up, we consider it of prime importance that post-graduate colleges should be developed as they are permanent institutions of higher research and training. The Second Plan provides for instituting or expanding post-graduate research and training programmes in 4 State Agricultural Colleges. It is recommended that this should be extended so that at least one agricultural college in each State is developed for initiating post-graduate research and education. It is obviously desirable that there should be some link between these colleges and the Central Research Institutions—such as the Central Rice Research Institute, Cuttack, and important State research institutes, so that facilities provided for research at these institutions are available for post-graduate students. On a rough estimation, the requirements of additional staff in 6 major subjects such as botany, agricultural chemistry and soil science, agronomy, horticulture, entomology and mycology, for 10 new post-graduate colleges would be as follows :—

Professors/Associate Professors

(Class I)

(One in each subject)

.. .. 60

Assistant Professors (Class II) (Two in each subject)	..	..	120
Lecturers/Demonstrators/Research Assistants	..	..	500

Strengthening Research Organisation in the States

3.10. Considering the size of the country, the wide variations that exist in soil and climate, and the great range and magnitude of the agricultural problems that still await investigation, it would appear necessary to build up, in addition to post-graduate colleges which will be permanent centres of higher research, a large net-work of research stations for dealing with the specific problems of each agro-climatic region and tract having a particular type of soil and climate. It is difficult to estimate the number of research and experimental stations that would be ultimately required. We feel, however, that at least 50 major research stations (including existing units) would need to be developed by the end of the Third Plan period; this would provide one properly equipped and staffed research station for undertaking research work in all the branches of agriculture of importance to each of the major agro-climatic region. Each of these stations would need to be supported by a number of sub-stations and we assume that on an average 2 sub-stations would be provided for each major research station during the Third Plan period. It will also be necessary to set up experimental farms in areas served by new irrigation projects with a view to evolving methods and means of ensuring the fullest and the most economical use of irrigation facilities. We have estimated on a very rough basis that during the Third Plan period, 30 such farms will be required to be set up. Thirty-four model agronomical farms are proposed to be established by the end of the Second Plan. At least 16 more such farms will have to be set up under the Third Plan to provide one model agronomical farm for each major agro-climatic region. The scheme of simple fertilizer trials on cultivators' fields which is expected to cover 200 districts by the end of the current Plan may need to be extended to the remaining 120 districts during the Third Plan period. As plant protection measures are an important means of raising agricultural production, it will be necessary at the same time to strengthen the entomology and mycology sections in the State agricultural departments. There would also be need for special developmental staff for each major food crop on the lines of developmental staff appointed during the Second Plan period for stepping up the production of some commercial crops.

3.11. On the basis of the assumptions made in the foregoing paragraphs, we estimate that the requirements of additional trained personnel for agricultural research (excluding post-graduate colleges), development

staff and *ad hoc* schemes of research likely to be undertaken during the Third Plan period will be of the order of 5,600 as indicated below :—

			<i>Number of centres</i>	<i>Additional Staff Scientific Officers</i>	<i>Research Assistants</i>	<i>Total</i>
1. Major research stations	..	50	500	1,500	2,000	
2. Sub-stations	..	100	400	1,200	1,600	
3. Experimental farms (Irrigation projects)	..	30	30	90	120	
4. Model 'agronomic farms	..	16	..	16	16	
5. Fertiliser trials on cultivators' fields	..	120 districts	30	120	150	
6. <i>Ad hoc</i> research schemes	..	..	340	1,020	1,360	
		..	1,300	3,946	5,246	
Staff for development work	..	100	300	400		
	..	1,400	4,246	5,646		

- (1) Additional staff has been proposed for 35 major research stations on the assumption that existing research staff would meet the requirements of 15 such stations.
- (2) It is assumed that each major research station would require on the average 3 scientific officers for plant breeding work, 1 or 2 each for agricultural chemistry, entomology and mycology, 3 for agronomy and 2 for horticulture. The requirements of particular stations would depend upon the number of crops dealt with at the station and the intensity of the problems involved.
- (3) It is assumed that each sub-station would require on the average 4 scientific officers one of whom will be a plant breeder and the remaining three will be specialists in agronomy or chemistry or entomology or mycology or horticulture depending on the problems dealt with.
- (4) It is assumed that about 350 *ad hoc* schemes may be taken up.
- (5) For purposes of estimation it is assumed that one scientific officer will be assisted on an average by 3 Research Assistants.
- (6) Requirements of personnel in agricultural statistics and agriculture engineering have been dealt with in the appropriate chapters.

The personnel required for agricultural research have been broadly grouped under two categories : (1) scientific officers, and (2) research assistants. Scientific officers include all officers of Class I and II status. The research assistants category includes all trained scientific personnel of non-gazetted rank.

The statement below shows the likely requirement of staff in each of the major branches of agricultural research and for special development schemes.

	<i>Scientific Officers</i>	<i>Research Assistants</i>	<i>Total</i>
1. Botany & Plant breeding	400	1,200	1,600
2. Agricultural Chemistry & Soil Science ..	200	600	800
3. Agronomy ..	250	750	1,000
4. Mycology ..	100	300	400
5. Entomology ..	100	300	400
6. Horticulture ..	250	750	1,000
7. Development ..	100	300	400
Total ..	1,400	4,200	5,600

Qualifications for research personnel

3.12. For posts of scientific officers we would need persons with a post-graduate degree or a doctorate in each field. The research assistants should be at least graduates with some experience. Agricultural research covers a wide range of subjects and it is possible, and often necessary, to have pure science graduates for filling some research posts. At the Indian Agricultural Research Institute, 60 per cent of the research workers are pure science graduates, and only 40 per cent of the posts are held by agricultural graduates. We find, on the other hand, that in Madras, 80 per cent of the agricultural research staff consist of agricultural graduates and only 20 per cent of science graduates. A hard and fast rule cannot therefore be laid down. We have assumed that roughly 50 per cent of the research posts in agricultural chemistry, entomology, mycology, and botany may be filled by pure science graduates. The requirement of agricultural graduates during the Third Plan period for purposes of agricultural research and development dealt within paras 3.10 and 3.11 has thus been taken as only 4,000. To this should be added about 500 agricultural graduates required for post-graduate research and education referred to in para 3.9. The total requirements of agricultural graduates may thus be placed at 4,500. Of this number 2,000 should have post-graduate qualifications.

Extension—Need for better trained V.L.Ws.

3.13. The absence of an Extension organisation has been for long the weakest link in the chain of agricultural development. The National Extension Service which started in 1953 and is expected to cover the entire country by the end of the Second Plan period is providing for the first time a permanent nation-wide organisation for carrying the results of research to the people and securing the participation of the people in the

programme of agricultural development. Agriculture, being the source of livelihood for over 70 per cent of the population of India and of over 80 per cent of the rural population, must occupy the pride of place in the NES programme. The effectiveness of this programme, however, must depend, to a very large extent, on the quality of training of the village level workers who are charged with the responsibility of explaining to the farmers the recommendations evolved in the research and experimental stations. Agriculture in India is based primarily on the methods and skills developed through the experience of generations of tillers. The farmer has confidence in his own methods that have been evolved by years of trial. Improved scientific practices and better farming techniques will be adopted by him only if these are presented with a degree of conviction and with some measure of professional competence. The educational qualification required for a village level worker is matriculation. He has thus hardly any grounding in the basic sciences. Before his appointment he receives a training of 12 months' duration in a basic agricultural school followed by a six months' extension course. The agriculture course is intensive and provides for 2,000 hours study, and two-thirds of the time is devoted to field demonstrations and practical work. The theoretical study is limited to 800 hours and within this short period, attempt is made to cover all aspects of agriculture and teach the trainee something about the related basic sciences. It is doubtful if a matriculate can properly absorb all this within the short time available and retain the knowledge gained for application in the field. The limited knowledge of scientific agricultural practices that he obtains during this twelve months' training is often blurred by the subsequent six months' Extension training in subjects which cover all aspects of rural life, such as health, hygiene, sanitation, social welfare, adult education, gram panchayats, civics, co-operation and village industries. The training which a village level worker gets at present is thus very inadequate and cannot give him the necessary confidence and competence for performing the very heavy and responsible duties that he is called upon to perform. Any shortcoming or neglect in the training of village level workers must, to our mind, result in the loss of confidence of the cultivator, and in defeating the objectives of the programme. The least that should be done, in our view, is to increase the period of training of the village level workers to at least two years, and to continue training in agricultural work throughout this period so that he has the experience of agricultural operations for at least two *kharif* and two *rabi* seasons. We are fully conscious that even this training will not be wholly adequate, and we are making this recommendation only as an interim measure. As the Extension programme develops, there will be progressively increasing demand for scientific information on a number of problems including soil improvement and management, agricultural engineering, farm management and economics. Taking a long range view, therefore, it would seem desirable that the village level workers should possess a degree in agriculture, or a level of training roughly equivalent to that of an agricultural graduate.

Jurisdiction of village level worker

3.14. We feel that with the present jurisdiction of 10 villages a multi-purpose village level worker cannot discharge his duties in relation to agricultural Extension and the agricultural production programme adequately. Some degree of personal contact between the extension agent and the farmers is essential for effective Extension work, and such contact

cannot be established and maintained with the present large jurisdiction. In this we are supported by the experience of countries like Japan, U. K., and Holland, which have highly developed Extension services and where very high yields are now being obtained as a result of sustained application of scientific techniques. In Japan, for instance, the Extension agent has a jurisdiction of roughly 500 to 600 holdings; in Scotland, it is only 200 holdings; in the Netherlands about 400. In all these countries, the agricultural Extension agent at the farm level has to deal with a better educated farming community and is concerned only with the work of agricultural Extension, and has nothing to do with distribution of any supplies, grant of subsidies, or other responsibilities of a business or a regulatory nature. The village level worker in India is a multi-purpose worker with a wide range of duties, and the number of individual farmers to be contacted is very large owing to the small size of holdings in India. There are also other difficulties, such as lack of village communications. An appropriate charge for a village level worker may be 5 villages of 500 to 600 farms. We have taken note of the fact that similar views have been expressed by the Study Team on Community Projects and National Extension Service.

Conclusions on Extension set-up

3.15. We considered the suitability of an alternative arrangement, under which for a group of ten villages, there would be two village level workers, one trained for and employed exclusively on agricultural extension, and the other trained for, and left free to devote all his time to the non-agricultural duties, at the village level. In deference to the views expressed by the representative of the Community Development Ministry, we have accepted that, for some time to come, there may be only one type of village level worker, with a jurisdiction of five villages. But our objective should be to raise this village level worker to the level of an agricultural graduate, over a period of time. If this became possible the multi-purpose character of the service at the village level would be maintained while ensuring adequate technical guidance to the farmers.

Extension set-up in other countries

3.16. In appendix II, we have presented a brief review of the organisational set-up of Extension services in selected countries. It would appear that in all countries outside India, the extension agent deals with agricultural problems only, and a number of subject-matter specialists are available to him for advice in technical matters. The functions of the subject-matter specialists, broadly, are : (1) to give such advice to the Extension agent in the field on problems of agriculture as necessary; and (2) to keep the problems of the area, insofar as they relate to his field, under continuous study, and remain in close contact with research institutes and experimental stations. There were nearly 11,000 Extension agents supported by 600 subject-matter specialists in Japan in 1952; and U. K. had 1,100 specialists and 400 general advisers in 1954. We consider that if our agricultural Extension is to succeed in its objectives, the village level worker should have the help and guidance at the Block level of 5 agricultural graduates (Extension officers) each with some specialised training in one or other subject, such as, soil science, agricultural engineering, etc. The provision of such aid is far more important in our country than elsewhere for our village level worker is a multi-purpose worker with only a limited amount of training in agriculture. It

would be necessary also to provide for subject-matter specialists with post-graduate qualification in their respective fields at the district level to give proper guidance to the Block level Extension officers. The subjects in which specialists/Extension officers should be provided in a particular district/Block would no doubt differ to some extent from area to area depending on the pattern of cultivation and other factors, but each district will need specialists in general agriculture, soil science and plant protection; and some may need also a horticulturist, or an agricultural engineer, or a specialist in Farm management including rural economics or a dairy expert. Exceptionally large districts with populations exceeding 12 lakhs and having a large number of blocks will need further strengthening. The district specialists might be stationed at the district experimental farms, research stations and sub-stations in the district so that they are in close touch with the experimental work being done in their districts. For purposes of administrative supervision, this specialist staff should be placed under the district agricultural officer who will have the over-all responsibility for supervision of the extension programme.

Similarly, each of the Extension Officers at the Block level would deal with specific aspects of agriculture according to his special training. These officers should have facilities for demonstrating their work on the fields of individual farmers spread over the jurisdiction of the Village Level Worker. In view of the fact that the officers at the Block level are at present administratively under the Block Development Officer, who, in most cases, is not a qualified agricultural officer, proper working arrangements are necessary and have already been evolved to ensure team work among the officers located at the Block. The additional Extension officers proposed at the Block level should be governed by the same arrangements.

To sum up, our recommendations are :—

- (a) that the training of the village level worker should extend over a period of at least two years and intensive training in agriculture should continue throughout this period;
- (b) that the jurisdiction of the village level worker should be reduced to five villages;
- (c) for effective technical guidance to the village level workers' the block staff should be strengthened by the addition of four agricultural graduates with some special training in selected subjects; and
- (d) there should be five agricultural subject-matter specialists at the district level with post-graduate training in their respective fields

Extension Wing in States

3.17. A small "Extension Wing", consisting of a selected number of subject-matter specialists with training in Extension methods to help to develop an effective Farm Advisory Service will be necessary in each State. This Unit should keep in close touch with agricultural research being done at the Central, State and Commodity Committees' research stations, and formulate authoritative recommendations on important farm practices and scientific techniques of production for the use of subject-

matter specialists at the district level and the Extension staff members, so that they could supply farmers with correct and up-to-date information on all aspects of agricultural production. It will also advise Information officers as to the kind of leaflets, pamphlets, farm news releases and other publicity or audio-visual materials that should be produced for the use of Village Level Workers and farmers, prepare the subject-matter for such publications; and also help in the planning and execution of special campaigns with regard to crop production.

Requirements for Extension

3.18. In estimating the number of agricultural graduates and post-graduate degree holders required for Extension work during the Third Plan period, we have assumed that specialists in general agriculture, plant protection and soil science would be provided in all districts. Similarly, agricultural graduates with some special training in particular subjects, would be located in all the Blocks. The remaining two specialists at the district level and the two Extension officers at the Block level should be selected having regard to their competence in dealing with two of the following four subjects viz. horticulture, agricultural engineering, farm management including rural economy and dairying, depending upon the pattern of agriculture in the area. A fruit growing district may thus have a horticulturist and farm management specialist while in other areas there may be greater need for specialists in dairying or agricultural engineering. The following table shows the distribution of the specialists and Extension officers :—

Subjects		Specialists at district level (Post-graduate degree holders)	Extension Officers at block level (Graduates)	Total number of graduates	No of agricultural graduates
(1)		(2)	(3)	(4)	(5)
General agriculture	.. ..	320	5,200	5,520	5,520
Soil Science	.. ..	320	5,200	5,520	5,520
Plant protection	.. ..	320	5,200	5,520	2,760 (a)
Horticulture	.. ..	160	2,500	2,660	2,660
Agriculture engineering	.. ..	160	500	660	— (b)
Farm management	.. ..	160	500	660	— (c)
Dairying	.. ..	100	500	..	— (d)
Extension Wing in States	.. ..	..	..	..	300
TOTAL		1,540	19,600	20,540	16,760
Extension officers in agriculture likely to be in position by March, 1961 at one per Block.		..	..	..	5,200
Additional requirements during the Third Plan period.		..	..	..	11,560

(a) It has been assumed that half the number of posts can be filled by graduates in science.

(b) Requirements of graduates and post-graduate degree holders in agricultural engineering are being provided in the chapter on agricultural engineering.

(c) This has been included in the total requirements under agricultural economics,

(d) These will be degree and diploma holders in dairying. A basic degree in agriculture is not essential.

Note :—The requirements of veterinary and animal husbandry personnel have been dealt with in separate chapters.

Requirements in Third Plan

3.19. We have assessed the requirements of agricultural graduates in other fields like soil conservation, co-operation, agricultural economics etc. in chapters dealing with these subjects. Likewise, we have assumed the needs of agricultural education in schools. The overall requirements of agricultural graduates will thus be :

<i>Subjects</i>					<i>Post-graduate degree holders</i>	<i>Graduates</i>	<i>Total graduates</i>
Replacements	..	..	..	..	300	2,700	3,000
Vacant positions at the end of Second Plan				..	200	800	1,000
Agricultural research and education	..	..	..	..	2,000	2,500	4,500
Agricultural Extension	..	..	..	..	1,100	10,400	11,500
Soil Conservation	..	..	..	..	200	800	1,000
Cooperation	..	..	..	..	..	2,500	2,500
Agricultural economics	..	..	..	..	700	1,300	2,000
Requirements of education at primary and secondary stage					..	2,000	2,000
TOTAL					4,500	23,000	27,500

Spreading the above requirements over the Plan period, it may be expected that the annual demand for agricultural graduates (during the Third Plan period) will be approximately 5,500.

Wastage should be reduced

3.20. For an annual output of about 5,500 agricultural graduates, it will be necessary to provide facilities for admissions of 6,000 students yearly, as against the admissions of 2,600 at present. We are assuming that the wastage in the colleges will not be more than 10 per cent. A general study of the results of agricultural colleges indicates that the percentage of failures is higher in the case of institutions which admit students after Matriculation than in those which take boys for a three year

course after they have passed Intermediate Science. It has also been observed that in well-established colleges which have been working for a number of years, the percentage of passes is generally of the order of 85 to 90. A wastage of more than 10 per cent in professional institutions must in any case be regarded as a serious matter, and it is necessary that wherever the incidence is higher, the authorities concerned should make a thorough investigation into factors responsible for it, and take measures to reduce the wastage.

Measures to meet requirements

3.21. For meeting the additional requirements of the Third Plan, the quickest way would perhaps be to expand, wherever possible, the existing institutions to the desired level without lowering the efficiency of training. It will be essential for this to ensure that a proper student-teacher ratio is maintained, and additional equipment and farm facilities are provided in these expanded institutions. On the assumption that the admission potential in the existing institutions could be increased to 4,500 and that the new Agricultural University proposed to be established at Rudrapur (U.P.) will take about 200 students per year, there would still be need for establishment of about 8 new institutions with a total of 1,300 seats. The new institutions will no doubt be set up in States or zones where the gap between output and prospective demand is the greatest. (see Table 8).

The training of an agricultural graduate extends over 3 to 4 years. The expansion of training facilities also takes time. It will be necessary therefore, to take action for further expansion of training during the Second Plan period. Meanwhile, proposals already under way for setting up new institutions like the Agricultural University, Rudrapur (Uttar Pradesh) should be implemented with all possible speed.

The Joint Indo-American Team on Agricultural Research and Education had suggested certain principles which might be borne in mind in selecting the location of new agricultural institutions with the object of developing research, education and Extension as an integrated programme. These principles appear to be sound, and we recommend their adoption.

Further training of Village Level Workers

3.22. We feel that experienced Village Level Workers who have the requisite qualification for entering a University may be encouraged and helped to enter agricultural colleges after acquiring 2 to 3 years practical experience in the field, in order to qualify for posts for which agricultural graduates would normally be eligible. They will bring to the agricultural colleges a more practical outlook. Village Level Workers who lack the basic qualifications for entry to a University could also—with advantage—be given higher training in suitable centres after they have served for some time to enable them to get an agricultural diploma. The possibility of developing such centres around the existing Extension Training Centres/Rural Institutes should be explored.

Proposed training facilities modest

3.23. China, with a somewhat smaller cultivated area than India's is already turning out 6,000 agricultural graduates per year, and has planned to increase the output to 8,000 by 1960. An annual production of about 5,500 graduates for India is obviously modest by comparison.

Given an average expectation of service of about 30 years, the annual outturn of, say, 5,000 agricultural graduates will reach about 1,50,000 at some point of time. If it is agreed that the village level workers should, eventually, be agricultural graduates, our requirements on this account alone would amount to about one lakh graduates. Research and education may require another 20,000 and specialist advisory services about 25,000. The total may be put at 1,50,000 in round figures. At the rate of 3 to 4 per cent wastage due to retirement, the annual replacement will be nearly 5,000 agricultural graduates when 1,50,000 graduates are in position. The additional training facilities recommended by us will thus need to be continued without reduction even beyond the Third Plan period for replacements alone.

Requirements of post-graduates in agriculture

3.24. Facilities for post-graduate education in agriculture are not well developed. The Indo-American Team on Agricultural Research and Education examined this question in 1955 and recommended that facilities for post-graduate education should be provided in at least four colleges, and at the I. A. R. I. This is being given effect to, and it is expected that all these post-graduate institutions will be set up during the Second Plan period with scope for admission of at least 40 students in each State institution. The I. A. R. I. will admit annually 200 students for the M. Sc. degree and 100 students for the Ph. D. degree.

On the basis of data furnished by the States/institutions, it is estimated that nearly 1,200 post-graduates will be required during 1957—61, while the output according to present capacity may be about 1,000 (Table 9). A few extra admissions which are likely to take place from 1958 against the additional training facilities being built up will slightly reduce the deficit. The present shortage of experienced officers for filling key positions will, however, continue for some time.

According to the estimates worked out in para 3.20, the requirements of post-graduates during the Third Plan period will be of the order of 4,500 (Table 10). On the basis of expansion of facilities recommended by us, the colleges will be in a position to turn out about 1,000 to 1,200 post-graduates annually. The full effect of the expansion will, however, be felt only in the later stages of the Third Plan.

Expansion of facilities for post-graduate research and education recommended by us will require well qualified personnel for teaching. It is important that the States should undertake an early review of the available personnel who are basically qualified for appointment in the post-graduate colleges, and arrange for their higher training where necessary.

Village Level Workers

3.25. Of the nearly 51,200 Village Level Workers estimated to be required up to the end of the Second Plan, on the basis of 10 per Block, 24,000 were trained up to November, 1957, leaving a balance of about 27,000 to be trained during the rest of the Plan period. The present annual capacity of the Basic Agricultural Schools and Extension Training Centres, which together impart an 18-month course is 10,700. Past experience has shown that the wastage is negligible. Assuming a maximum of 10 per cent, the remaining 27,000 Village Level Workers could be trained by October-November, 1960, if the capacity of the training centres is utilised fully.

The Study Team on Community Projects and National Extension Service has expressed the view that it would be advisable to stagger the opening of N.E.S. Blocks up to 1963 instead of trying to cover the whole country by 1961. If this recommendation is accepted by the Government, the requirements of fresh Village Level Workers will be spread over a longer period. The training centres could usefully utilise their surplus capacity to give refresher courses to those Village Level Workers who have been in the field for, say, three years.

As stated earlier, we are in favour of reducing the jurisdiction of the Village Level Workers to five villages as recommended by the Study Team on Community Projects and National Extension Service. We have also recommended that the total training given to the Village Level Workers should be extended from 18 months to two years. If these recommendations are accepted by the Government, another 51,200 Village Level Workers, trained over a longer period, would be required. The existing training centres, with suitable modification, should be adequate to train this number.

CHAPTER IV

ANIMAL HUSBANDRY

Introduction

4.1. India is the country with the largest cattle population in the world. According to the 1950-51 census, the cattle population was 199 millions. The 1955-56 census put the figure at 203 millions, showing a small increase of 2 per cent in five years. Over the next few years the trend may continue. In addition to cattle, India has about 40 million sheep, 50 million goats and 73 million poultry. An appreciable portion of the total income of the people in this country is derived directly or indirectly from livestock and livestock products in the form of milk, wool, meat, eggs, manure, etc. With better attention to livestock improvement, our income from these sources would be much more.

The present low level of production of Indian livestock is basically the result of improper feeding, haphazard breeding and lack of good management. To take cattle, for instance, the feed resources of the country cannot maintain, on an adequate plane of nutrition, more than half the existing population. Breeding facilities are grossly inadequate, there being only one approved bull where 250 are required. In spite of measures directed towards the elimination and control of cattle diseases, a number of diseases still continue to prevail, causing heavy mortality or disability. Similar situation exists in respect of other livestock. Scientific breeding, adequate feeding and efficient disease control must all be simultaneously undertaken, if any appreciable progress is to be made.

For an all-round improvement of cattle, a scheme known as the "Key Village Scheme" was launched on an all-India basis during the First Plan. Under this scheme, efforts are concentrated in selected areas where superior pedigree bulls produced on Government farms are sought to be multiplied. In these areas, comprising one or more contiguous villages with a population of 2,000 cows and or buffaloes of breeding age, only selected bulls are used. In order to accelerate the pace of progress, the technique of artificial insemination is being exploited. The breeding programme is supplemented by adequate provision for feeding, disease control and proper marketing of the produce. During the First Plan, 150 artificial insemination centres and 600 "Key Villages", covering approximately three lakh cows fit for breeding, were established. During the Second Plan, this scheme has been considerably expanded. The size of each unit of one artificial insemination centre and four "Key Villages" of 2,000 cows has been enlarged to one artificial insemination centre and six "Key Villages" with a total population of 5,000 animals. Extension centres are also being established where bulls produced in "Key Villages" will be utilized. The total number of cows expected to be covered under this intensive improvement programme by the end of 1960-61 is 17 lakhs. Towards the end of the Second Plan, these breeding cows are expected to produce per year nearly 5,000 bulls of high quality, which will reduce the gap between the availability and requirement of breeding bulls from one in 250 to one in 50. However, many more generations of breeding will be required before we reach a high standard of productive efficiency. The staff provided for each "Key Village" unit consists of one veterinary graduate and about eight stockmen.

During the First Plan period, the work on sheep and wool development was confined to the establishment of research stations and sub-stations in the States which are important for sheep. During the Second Plan period measures are being taken to grade up local sheep with improved rams. For this purpose, 396 intensive sheep extension centres are to be established. Each centre will cover a sheep population of 2,000 breeding ewes. In these centres, improved sheep management practices will be demonstrated and facilities for the treatment and shearing of sheep will be provided. Simultaneously, for carrying out research in sheep breeding and for production of superior rams, three sheep-breeding farms are being established in areas which have not, had any sheep breeding farms so far. At each of the extension centres, a trained stockman will supervise the work of sheep improvement, and eight such centres will be looked after by one Veterinary Graduate.

A pilot project for the development of poultry was taken up in 1955, under which 33 Extension centres were established in the different States. During the Second Plan period, a more comprehensive scheme has been launched. This scheme envisages the setting up of five Regional Poultry Farms each with about 2,000 laying hens, with the object of supplying poultry of improved strains to the States for Extension work, and the establishment of an additional 267 Extension-cum-development centres. The intensive development blocks are to be located, as far as possible, in areas covered by the Community Projects and National Extension Service Blocks. In each Block, 300 four to five month old birds (200 females and a 100 males) would be distributed at a concessional rate of two rupees per bird. All existing cockerels will be removed from these areas. A demonstration centre or unit is also proposed to be attached to each Extension centre. This will consist of a 100 birds (90 females and 10 males). These Extension centres, which will be in the charge of a Supervisor or Poultry Assistant (Stockman's grade), are designed to demonstrate modern methods of poultry-keeping and management to farmers in the development blocks. They will also assist villagers in the hatching and marketing of eggs. Provision has also been made for training of farmers in Poultry Husbandry at these demonstration centres.

The control of diseases of livestock was the first to receive attention when Veterinary Department were established in this country. This was but natural, because disease used to take a heavy toll of livestock. The set-up in the States, therefore, consisted of a chain of hospitals and dispensaries for treatment of sick animals and for control of contagious diseases by inoculation or vaccination. Broadly, this work is dealt with in the States by the Veterinary Department with a Director in charge who is assisted by three or four Deputy Directors or Assistant Directors at the regional level to supervise the work of the subordinate staff in charge of hospitals and dispensaries in the districts. Veterinary Departments which started with disease control work now deal with livestock improvement work as well. For this purpose, the departments have been reorganised in many States— and function as Veterinary and Animal Husbandry Departments.

Towards the end of the First Five Year Plan, a scheme for the eradication of Rinderpest, the most deadly disease of cattle, was launched. This scheme has been extended to the entire country during the Second Plan. There are 280 field units in operation for inoculation, the units moving from one district to another. Each unit consists of one graduate assistant and

four stockmen. In some cases, where veterinary graduates are not available, experienced stockmen have been provided. About 160 veterinary graduates and 1,000 stockmen are at present employed on this work. Another 140 units are being established in the States which have taken up the work recently.

Measures taken to meet demands

4.2. The demand for qualified personnel to execute the animal husbandry programmes steadily increased as the developmental measures gained momentum. Accordingly, in 1955, the Ministry of Food and Agriculture, in consultation with the Planning Commission, made a broad assessment of the requirements of veterinary graduates during the Second Plan with a view to expanding the training facilities. It was estimated that between 5,000 and 5,500 veterinary graduates would be required during the Second Plan period as against an output of 1,400 on the basis of facilities then available. Accordingly, with assistance from the Government of India; the State Governments set up four new Veterinary Colleges in Kerala, Andhra Pradesh, Orissa and Madhya Pradesh. Further, permanent training facilities in the then existing institutions were expanded. In addition double shifts were instituted in three veterinary colleges. As a result of this expansion, the output from veterinary colleges during the Second Plan period was expected to increase from 1,400 to 3,500, still leaving a shortage of 2,000 veterinary graduates. (See table 11). In order to make up this deficit, nine State Governments, with financial assistance from the Central Government, started an emergency course of two years' duration for imparting a more or less practical training to suitably qualified youngmen, so that they might be able to handle many of the routine field duties under the general guidance of qualified veterinary graduates. The minimum qualification for admission to this course was Matriculation or its equivalent, but preference was given to candidates who had passed Intermediate in Science with Physics, Chemistry and Biology.

Requirements and output reassessed

4.3. The requirements of veterinary graduates have now been reassessed on the basis of the data furnished by the State Governments/institutions. It is estimated that 5,100 veterinary graduates would be required during the years 1957 to 1961. The output from the colleges, on the basis of actual admissions, with a 30 per cent wastage, will be 2,700, and that of the two-year emergency certificate holders 2,100. There will thus, be a very small deficit of about 300 veterinary graduates by the end of March, 1961. Table 12 gives details of the existing position. Table 13 gives details of requirements and output.

Though the overall supply and demand position of veterinary personnel during the Second Plan period appears to be satisfactory, it will be seen from Table 14 that there is a surplus in certain regions and a deficit in certain others. Similarly, some States will not have their full requirements met during the Second Plan.

In the Northern Region, the position in the Punjab and Rajasthan is satisfactory; but Jammu and Kashmir and Himachal Pradesh have no veterinary college of their own. At present, arrangements have been made for training students from Jammu and Kashmir and Himachal Pradesh in the Punjab and Rajasthan. These arrangements should be continued on a long-term basis and there is no need to establish separate colleges in these States.

In the Central Region, there will be a surplus in Madhya Pradesh and a deficit in Uttar Pradesh, although taking both the States together, there will be no deficit. The establishment of an Agricultural University at Rudrapur will considerably increase the training facilities for veterinary graduates in Uttar Pradesh; but during the Second Plan period, Uttar Pradesh will be well advised to absorb surplus trained personnel from Madhya Pradesh to meet its immediate requirements.

In the Eastern Region, there is no appreciable over-all shortage. However, the position of West Bengal and Orissa merits consideration. West Bengal will have deficit to the extent of about 150 and Orissa about 80. The West Bengal Government, for administrative reasons, was unable to accept financial assistance from the Centre for expanding the training facilities in the Veterinary College at Calcutta, as there is a proposal to shift that college to Harringhata. As a long-term measure, when West Bengal establishes its Veterinary College at Harringhata, it will be able to step up considerably the output of veterinary graduates to meet its own needs, but during the interim period it will have to depend, to a large extent, on utilizing the surplus two year emergency course trainees from the other States in the region. The deficit in Orissa is more apparent than real. The new college in Orissa was started in 1955 and will turn out graduates only from 1959. Meanwhile, the Orissa Government had made arrangements to train 50 veterinary graduates in other States, and these will be available during the Plan period to make up a good part of the deficit.

The Western Region, consisting of Bombay and Mysore, is one of the real deficit regions. This is primarily due to the fact that Mysore has no veterinary college of its own. Sanction has, however, been accorded to the starting of a new veterinary college in Mysore in 1958. The proposal to start this college is timely, and measures should be taken to ensure the admission of the largest number of students from the first year onwards. Mysore was, however, getting its students trained in Madras, Andhra (Hyderabad) and Bombay and these should meet a part of Mysore's requirements until it starts getting graduates from its own projected college.

The deficit of about 50 trained officers in Bombay State is mainly due to the situation arising from the reorganisation of States. The requirements of Marathwada and Vidharba, which have merged with Bombay from the old Hyderabad State and Madhya Pradesh, respectively, were intended to be met from candidates under training at Hyderabad and Jabalpur Veterinary Colleges. We suggest that the Bombay Government may endeavour to utilize the two year emergency course products from Madhya Pradesh, which will have a surplus of such personnel.

In the Southern Region, there is no over-all deficit, but Madras and Kerala have some deficit, which should be made up during the Second Plan period by employing surplus products of the two-year emergency course in Andhra Pradesh.

The study Team on Community Project and National Extension Service has recommended that it would be advisable to stagger the opening up of N.E.S. Blocks up to 1963, instead of 1961. If this recommendation is accepted by the Government, the requirements of veterinary graduates will be considerably reduced. In that case, there will actually be a surplus of veterinary trained personnel by March, 1961, if the two-year emergency certificate holders are also taken into account.

Wastage to be reduced

4.4. A study of the admissions to the Veterinary Colleges and pass percentages of those who pass, shows that the average wastage has been of the order of 30 per cent, and that the maximum wastage occurs in the first year of the course. This is largely due to candidates seeking admission to veterinary colleges simultaneously applying for admission to other professional colleges, and discontinuing when they get admissions elsewhere. This wastage actually results in an incomplete utilisation of the existing facilities for training. We would suggest that the institutions concerned should examine this carefully and try to reduce such drift to the minimum. This could be avoided in various ways. Firstly, the service conditions and the scales of pay for veterinary graduates could be made more attractive. There is hardly any private practice for veterinarians in India, and only suitable scales will attract better students to this profession. Veterinary colleges in one or two States which have recently upgraded the scales of pay for veterinary graduates have no difficulty in retaining the candidates admitted. Secondly, the grant of stipends to students in the veterinary colleges will also help to attract and retain students. Thirdly, institutions facing such drifts year after year might, with advantage, select a certain number of candidates in excess of the available seats and issue provisional admission notices to the students on the reserve list, so that they could take the place of students who drop out.

Post-Graduates

4.5. The number of existing posts for post-graduate degree holders in Veterinary Science is about 400, and the number of posts that will be sanctioned during the four years, 1957—61, will be about 200. A large number of sanctioned posts is held by personnel not having a post-graduate degree. This was inevitable as till recently facilities for post-graduate training in Veterinary Science had existed only at the Indian Veterinary Research Institute, and that too to a limited extent. The veterinary colleges in this country were conducting only Diploma courses and were concerned primarily with training men to look after veterinary dispensaries and to do routine types of veterinary work such as inoculation and castration. Personnel for higher posts were usually trained abroad. However, with the growing demand for a more specialised type of veterinary service, and with a view to raising the status of veterinarians to that of men in other technical and professional fields, it was decided some 12 years ago, to upgrade the veterinary colleges and to get them affiliated to Universities. When the veterinary colleges were running only Diploma courses, it was not possible to provide any facilities for post-graduate training. The I. V. R. I., which had very limited facilities, could award only one or two post-graduate degrees in a year. Consequently, the veterinary colleges in this country at the present moment are; to a large extent, staffed by men many of whom have improved a great deal from practical experience, but who all the same, have not had the benefit of post-graduate training in the subjects which they teach.

Realizing this deficiency, the Indo-American Team on Agricultural Research and Education suggested that at least four of the existing veterinary colleges might be upgraded to function as centres for post-graduate education. They further recommended that a separate college for imparting post-graduate training should be set up at the Indian Veterinary Research Institute.

Action to implement these recommendations is being taken. It is proposed to upgrade the Madras and Mathura veterinary colleges to post-graduate colleges in 1958, while the Patna and Bombay Colleges are proposed to be upgraded in 1959. Plans to set up a post-graduate college at the I. V. R. I. this year are also under consideration. It will be observed that the shortage of post-graduate degree holders during the present Plan period is mostly inevitable. However, the fullest advantage is being taken of the inter-institutional arrangements between five Land Grant Colleges in the U. S. A. and Agricultural and veterinary colleges in India to depute as many men as possible from amongst the members of the teaching faculties of the various veterinary colleges for being trained at suitable centres in the U.S.A. Advantage is also being taken of other foreign aid programmes such as those under the FAO, TCM and Colombo Plan to get the staff of the veterinary colleges and research institutions trained in research work, so that the standard of teaching and research in the country might be improved. Some of these men are from colleges which are proposed to be upgraded for post-graduate studies. In view of the late start of animal husbandry and veterinary education at the university level, the development of post-graduate education has not made much headway so far. It is essential, therefore, that the modest proposals for the establishment of post-graduate colleges during the Second Plan are implemented with all speed.

Training of stockmen

4.6. To assist the limited technical personnel available, many States are training stockmen for the routine types of jobs such as castration, inoculation and first-aid. The requirements in respect of stockmen, in view of the comparatively underdeveloped State of the various State Departments, have upto now not been very large. The course with some variations, generally occupies a period of one year. The persons admitted are required to have passed or studied up to the Matriculation standard. These men are quite competent for routine types of jobs, and some of the more experienced amongst them have even been placed in charge of dispensaries. There are about 20 centres in the country for training stockmen, with a total output of about 1,500 a year. These centres are expanded or contracted as required. The existing arrangements appear adequate. Adjustments in these training centres are not difficult as they do not require much in the way of equipment or laboratory.

Objectives during Third Plan

4.7. Livestock improvement being of a long-term nature, the measures to be undertaken during the Third Plan period will, in the main, be a continuation of those initiated under the current Plan. It should, however, be the endeavour to provide better veterinary service by opening more hospitals and dispensaries. While hospitals and dispensaries will both be under the charge of veterinary graduates, hospitals will be at the district headquarters, and in bigger towns, and will have facilities for indoor treatment. The number of veterinary hospitals or dispensaries at the end of the First Plan was 2,650, each serving, on an average, 77,000 cattle. Under the current Plan, about, 1,900 hospitals and dispensaries are expected to be added. There will then be one veterinary hospital/dispensary per 47,500 head of cattle. The Royal Commission on Agriculture had recommended in 1929 that the long-term objective in

providing hospital facilities for livestock should be on the basis of one institution per 25,000 cattle. We have considered whether this would be adequate in the context of the development we are visualising. It has been pointed out that in the Punjab, for instance, there is one veterinary hospital/dispensary per 13,000 cattle and in the Uttar Pradesh one hospital/dispensary serves, on an average, 24,000 cattle. On the other hand, there are areas, as in Madhya Pradesh, where one veterinary hospital/dispensary serves about 100,000 cattle. It may be mentioned that not all the dispensaries in Uttar Pradesh and the Punjab are manned by veterinary graduates. In the circumstances we are inclined to view that while the long-term target laid down by the Royal Commission may not be regarded as altogether satisfactory as an ultimate desirable objective, for the next few years, a hospital/dispensary serving 25,000 cattle may be accepted as providing a fairly good service. This would necessitate the establishment of an additional 4,000 hospitals/dispensaries, thus raising their number to 8,550. The veterinary officers in charge of the hospitals/dispensaries would be able to look after both livestock development and disease control work.

Need for district specialists

4.8. For giving advice to farmers on the many livestock problems, the veterinary officers would require competent advice from specialist qualified in the different aspects of livestock improvement. We consider that provision should be made for the following four subject-matter specialists with post-graduate training, to be appointed at each district headquarters :

- (1) Diagnostic and epidemic control Specialist
- (2) Livestock Specialist (Cattle)
- (3) Livestock Specialist (Sheep and Goat)
- (4) Livestock Specialist (Poultry).

In areas where there is no scope for each of these activities, say, for instance, in regard to sheep and goats, the number of specialists will be smaller. For purposes of calculation, we are assuming that about 600 specialists will be required during the Third Plan. Depending upon the progress of the post-graduate institutions, additional specialists may be posted according to the needs of the districts.

Development programme

4.9. The programme of cattle improvement initiated through the Key Village Scheme will continue. By the end of the Second Plan, 350 "Key Village" centres are expected to be in operation. Another 150 centres may be added during the Third Plan period, so that there will be at least 20 centres covering an adult cow/buffalo population of 1,00,000 in each of the 25 important breeding tracts. Work on the production of animal feeds and fodder will be intensified. The programme for the development of poultry undertaken under the current Plan may be intensified, and 300 more Extension centres may be added during the Third Plan period. Similarly, in connection with sheep development work, an additional 400 centres may be set up. The Rinderpest eradication scheme is expected to be completed by the end of the current Plan, except for a small spill-over, in a few States, into the Third Plan.

Research

4.10. A development programme of this magnitude will require adequate research support. There are, at present, no adequate facilities for post-graduate research and teaching. As we have mentioned earlier, it is expected that, by the end of the current Plan, these facilities would have been provided in four veterinary colleges and at the I. V. R. I. A few more colleges may also be equipped to undertake post-graduate research during the Third Plan period. A plan for the establishment of Regional Livestock Research Stations during the present Plan period was mooted, but could not be given effect to due to lack of funds. These Research Stations should be established under the Third Plan. The States are also expected to strengthen their livestock research station.

Requirements of veterinary graduates

4.11. In the light of the foregoing review and considerations, the requirements of fresh veterinary graduates during the Third Plan period are estimated at 6,800 as detailed below :—

1. For 4,000 additional dispensaries	..	4,000
2. Extension specialists at district level	.. ..	600
3. Key Village scheme and sheep development scheme	.. ..	200
4. Research and education	.. ..	700
5. Replacements	.. ..	800
6. Vacant positions at the end of Second Plan	.. ..	300
7. Miscellaneous requirements (Central, State and Municipal services)	.. ..	200
Total	..	6,800

Measures to meet requirements

4.12. The admissions to the existing 14 Veterinary colleges during 1957 were of the order of 1,100. It may be possible to increase the admissions in a few colleges. On the assumption that the annual admissions could be increased to at least 1,200 and that the new veterinary college in Mysore and the Agricultural University at Rudrapur will admit about a 100 students from 1958 and 1959, respectively, the output of veterinary graduates during the Third Plan period, with a 10 per cent wastage, may be estimated at about 5,800. A wastage of more than 10 per cent in a professional institution will be a serious loss, and is, in our view preventable.

There will thus be a shortage of about 1,000 veterinary graduates during the Third Plan period which could be made good in the first year of the Fourth Plan. We have carefully considered whether any additional institutions would be required to meet this shortage and whether full utilization of the additional training facilities that may be created would be ensured beyond the Third Plan. Taking a long range view, we feel

that the maximum use of the existing institutions together with the new institution to be set up in Mysore and the proposed Agricultural University at Rudrapur, Uttar Pradesh, may be adequate to meet our needs.

It is possible that some States may feel the need for additional institutions to meet all their requirements with the products of their own respective institutions or for relieving pressure in their existing institutions. We suggest that the States concerned should first ensure maximum utilization of the capacity of the existing institutions by facilitating increased admissions. Having done that, if a State Government still feels the necessity of, and is keen on setting up a new veterinary college and is prepared to find the required land and buildings, the proposal would deserve consideration.

The State-wise requirements of veterinary graduates and estimated output in the Third Plan period are given in Table 14.

Requirements of persons with post-graduate qualifications

4.13. The requirements of persons with post-graduate qualifications in animal husbandry and veterinary science during the Third Plan period will be about a 1,000 (600 specialists at district level and 400 for research and education) involving an annual output of about 200. The four colleges and the Indian Veterinary Research Institute, which are being developed under the current Plan as centres of post-graduate research and teaching, would meet these requirements.

Requirements of stockmen

4.14. Under the Second Plan, there is a provision for the appointment of two stockmen in each of the 1,125 Community Development Blocks; but no stockmen have been provided for the N. E. S. Blocks. For providing adequate veterinary service, there should be at least four stockmen in each Block (one per 25 villages). In addition, there should be one stockman for each hospital/dispensary. After making allowance for 2,250 stockmen likely to be available by the end of the Second Plan, the additional requirements of stockmen would be about 27,000. The requirements of stockmen in respect of other schemes would be as under :—

150 additional Key Village centres		
150 X 8 .. .. .	.. .. .	1,200
300 poultry extension centres .. .. .	.. .. .	300
400 sheep extension centres .. .. .	.. .. .	400
Key Village extension centres etc. .. .. .	.. .. .	1,100
Total .. .. .	.. .. .	3,000

The total requirements of stockmen may thus be placed at about 3,000. The States should establish training centres during the last year of the current Plan, so that the first batch may become available during the first year of the Third Plan. About 70 training centres may be necessary. Each centre will take in 100 candidates every year, of whom, allowing for wastage, 90, are expected to qualify. The number of centres to be established in each State would depend of course on its requirements.

CHAPTER V

DAIRYING

Introduction

5.1 According to the "Indian Livestock Statistics, 1953-54 to 1955-56", the daily *per capita* consumption of milk, including milk products, averaged 4.76 oz. for the whole Union in 1956. Great regional differences; however, exist in this regard; the consumption was 13.65 oz. in the Punjab, 9.05 oz. in Rajasthan, 7.80 oz. in Himachal Pradesh, 6.97 oz. in U.P. and generally less than 5 oz. in the rest of the country. In Kerala and Assam, it was as low as 1.32 and 1.25 oz. respectively.

The Nutrition Advisory Committee has recommended that a balanced diet for an adult Indian should include 10 oz. of milk *per diem*. On the other hand, the Indian Council of Agricultural Research in the "Memorandum on the development of Agriculture and Animal Husbandry in India" and the Planning Commission have placed the daily requirement at 15 oz. Judged by even the lower recommended standard of 10 oz., the available supply of milk is inadequate to varying extent all over India, except in the Punjab. The position is equally unsatisfactory in respect of other foods like fish, meat and eggs, which supply proteins of high quality. As a result, the average Indian diet contains too much of cereals and too little of protective foods. But, as the population continues to increase annually at a rate of $1\frac{1}{2}$ to $1\frac{1}{2}$ per cent even the present unsatisfactory position cannot be expected to improve sufficiently unless milk production can be increased at a rate considerably faster than the growth of population.

The prevailing low production of milk in India is basically due to lack of an organised dairy industry. Milk generally gives the best return when sold for liquid consumption. But there is little demand for this purpose outside the urban areas. The urban population is less than one fifth of the total population at present, but due to greater industrialisation it is on the increase. Even this limited urban market is more or less the monopoly of the city milkman and it is denied to the rural producer who has to sell the milk which he produces to the middlemen, by and large, for manufacturing milk products. The price the primary producer gets is poor, and it gives him no incentive to produce more. As a result, he takes to the production of food and cash crops for which he has a ready market; and because he requires bullocks to raise such crops, he rears draught rather than milch cattle. A remunerative market for milk, on the other hand, would give him a new daily "cash crop", which should induce him to produce more milk. This is supported by experience both in India and abroad. In the Anand area of Gujarat, for instance, provision of good market for milk through the Bombay Milk Scheme and a Co-operative Milk Products Factory has led to a very great increase in the output of milk. Similarly, the establishment of the Milk Marketing Board in England, which assured a good market to dairy farmers, has resulted in increasing milk production by nearly 70 per cent during the past two decades and the increase continues at the rate of 4 to 5 per cent per annum at present.

Dairy development during Second Plan

5.2 For the first time, a comprehensive programme of dairy development has been included in the Second Plan. This programme has the objective of producing more and better milk, raising the level of milk consumption and assuring a better return to the primary producer. These objectives are sought to be achieved by organising urban milk supply schemes, rural creameries and milk products factories in different parts of the country. Since disposal of milk for liquid consumption gives the best return, more emphasis has been laid on urban milk supply schemes. Rural creameries and milk products factories will find a market for milk produced in areas which are not suitably located in relation to an urban consuming centre.

The four largest cities, viz., Calcutta, Bombay, Delhi and Madras will each have a milk supply scheme and a Cattle Colony for the removal of milch animals at present housed within these cities.

Additionally, milk supply schemes, without the Cattle Colonies, will be taken up in 37 other cities with population exceeding one lakh each; 12 rural creameries and 7 milk products factories are also to be established. Each of these schemes will get its supply of milk from producers' co-operatives which will be organised in rural areas. To rationalise the milk trade, a statutory Milk Board will be constituted for each city to which milk supply is undertaken.

The implementation of this programme will, no doubt, give the country the nucleus of an organised dairy industry. To solve the problems of this new industry, the Plan provides for the re-organisation, expansion and intensification of dairy research at the National Dairy Research Institute, Karnal, and its regional stations.

Classification of personnel

5.3 The personnel required may be classified as under :—

- (A) (i) Dairy Farm Managers, Supervisors and other staff for dairy husbandry work—Indian Dairy Diploma holders; B.Sc. (Agri.) with specialised training in dairy husbandry and B.Sc. (Dairy Husbandry).
- (ii) Factory Manager—B.Sc. (Dairying)
- (iii) Factory Supervisors, Managers of rural milk collection centres and milk production organisers I.D.Ds.
- (iv) *Dairy Factory Engineers*—B.Sc. (Dairying) or graduates in mechanical/electrical engineering.
- (v) Dairy Chemists and Bacteriologist—B.Sc. (Dairying) or M.Sc. in Chemistry/Bacteriology with specialised training in Dairy Bacteriology.
- (B) Research and teaching staff—persons with post-graduate qualifications who have specialised training in the particular branch of dairy research or dairy education.

Requirements of personnel during the Second Plan

5.4 It is estimated that about 600 qualified dairymen and higher staff will be required for implementing the dairy development programme and for meeting the requirements of the private sector, as under :—

I.D.D.	.. ..	190
B.Sc. Dairying or B.Sc. (Agri.) with specialisation in Dairying	.. .	180
Engineers B.E. (mechanical/electrical) with specialised training in dairy engineering	..	70
Dairy Chemists/Bacteriologists for milk scheme	... ..	100
Post-graduate degree holders for research and teaching (M.Sc. and Ph. D).	..	50

Facilities for institutional training

5.5 The existing facilities for basic institutional training are shown in Table 15. These facilities, it will be seen, are adequate for meeting the requirements of Indian Dairy Diploma holders. The number of graduates in dairying who will come out of the two institutions will, it is true, be only 110 as against the requirement of 180. However, as the requirement can also be met to some extent by graduates in agriculture, who have specialised training in dairying, the short-fall may not be of much consequence. The required number of engineers, it is hoped, will be available from the Engineering Colleges and the specialised training in dairying to be given to them can be arranged in the milk supply plants at Aerey, Anand or Haringhata. Similarly, the Universities should be able to meet the requirements of dairy chemists, dairy bacteriologists and personnel required for research and teaching positions in these branches.

Facilities for in-plant training

5.6 The position regarding basic institutional training is thus not unsatisfactory. What is, however, necessary is to arrange in-plant training for persons who will be responsible for running the commercial milk supply schemes e.g.,—managers, engineers, etc. Such training will be given at the existing dairy institutions and the new milk schemes which are being taken up during the Second Plan period, such as the Delhi Milk Supply Scheme, the Madras Milk Supply Scheme, the milk products factory at Amritsar and rural creameries at Barauni (Bihar), Aligarh and Junagadh.

Need to utilise facilities fully

5.7 It is, however, important to make full use of the existing instructional facilities, particularly at the National Dairy Research Institute, Karnal, where only 20 students were admitted to the B.Sc. (Dairying) course in 1957, although training facilities are available for admitting 60 students annually. The admission during 1957 was restricted to 20 partly because of lack of adequate hostel facilities, and partly because it was feared that the dairy development programme might be affected by foreign exchange difficulties. This cautious approach has also been partly influenced by the limited employment opportunities in the past for the Indian Dairy Diploma holders who passed out of the Dairy Research Institute, Bangalore and the Agricultural Institute, Allahabad. But, as a developing economy should offer scope for the establishment of dairy project in the private sector, which will also require qualified personnel, we feel that the available facilities should be utilised to the full.

Dairy Development during the Third Five Year Plan

5.8 It is hoped that by the implementation of the dairy development programme envisaged in the Second Plan, the foundation of an organised dairy industry would have been laid. Including the existing institutions, nearly 60 urban milk supply schemes, 12 rural creameries and 9 milk products factories will be in operation in different parts of the country at the end of that period. These measures to increase the marketing of milk with a better return to the primary producer should lead to greater milk production.

With the expansion and re-organisation of the National Dairy Research Institute, Karnal, and its southern regional station at Bangalore, and with the establishment of two other regional stations in the East and the West, the country will also possess a suitable set up for dairy research.

The successful implementation of the foregoing programme, should, therefore, pave the way for still larger development during the Third Plan period. The aim should be to set up milk supply schemes for all cities with population exceeding 50,000 and to find a market for milk remaining untapped in important 'milk pockets' by the establishment of milk products factories in such areas.

According to the 1951 Census, there were 113 towns with population exceeding 50,000 for which milk supply schemes are not in view during the Second Plan period. Because of the increase in population, and with new industrial units coming up, this number is likely to increase by the beginning of the Third Plan. For the purpose of our calculations we have assumed that milk supply schemes may be taken up in 120 cities, and milk products factories in nine areas. The State-wise distribution is shown in Table 10.

Need for specialist dairy staff at Block and District levels

5.9 To ensure satisfactory milk supply to the large number of dairy institutions which will be established during the Second and Third Plan periods, it will be necessary to provide Dairy specialists at the district level and Extension officers at Block level. In the chapter on 'Agriculture' we have recommended the appointment of five Extension officers at the Block level and five Extension specialists at the district level. We have assumed that during the Third Plan period such Extension officer/specialists in dairying will be posted in 500 Blocks and 100 districts.

Requirements of personnel

5.10 The requirements of technical personnel for the milk supply schemes, milk products factories and specialists and extension staff are estimated as under :—

	Urban Milk supply Scheme	Milk products factor- ies	Total	Institutional training required
1. Rural milk production organisers ..	450	90	540	I. D. D.
2. Milk collection centres				
(i) Managers	344	27	371	B. Sc. (Dairying).
(ii) Chemists	172	27	199	M. Sc. in Chemistry or B. Sc. (Dairy- ing).

				Urban Milk supply Scheme	Milk products factories	Total	Institutional training required
(iii)	Bacteriologists	..	..	172	27	199	M. Sc. in Bacteriology or B. Sc. (Dairying)
3. Dairy Factories:							
(i)	Managers	..	..	120	9	129	B. Sc. (Dairying).
(ii)	Shift Managers	..	..	101	18	119	B. Sc. (Dairying).
(iii)	Dairy Supervisors	..	..	259	90	349	I. D. D.
(iv)	(a) Chemists	..	..	70	27	97	M. Sc. (Chemistry) or B. Sc. (Dairying).
(iv)	(b) Bacteriologists	..	..	70	27	97	M. Sc. (Bacteriology) or B. Sc. (Dairying).
(v)	Dairy Engineers	..	..	120	9	129	B. E./B.Sc. (Dairying).
(vi)	Shift Engineers	..	..	99	18	117	Do.
(vii)	Milk Sales Officers	..	..	120	9	129	B. Sc. (Dairying)
(viii)	Assistant Milk Sales Officers			221	18	239	I. D. D.
4. Extension Staff at the							
(i)	NES Blocks	..	..	—	—	500	I. D. D.
(ii)	Specialists in the districts	..	..	—	—	100	B. Sc. (Dairy Husbandry) with post-graduate training).
TOTAL				2,318	396	3,314	*

Training facilities required

5.11 To provide the above staff, training facilities will be required as indicated below:—

				1,878
B.Sc. (Dairy Technology)	..	..	820	
B.E.	..	..	246	
M.Sc. (Chemistry)	..	..	285	
M.Sc. (Bacteriology)	..	..	285	
B.Sc. (Dairy Husbandry)	..	..	100	

5.12 The annual output of I.D.D.'s from the existing institutions at Bangalore and Allahabad will be 45 as against the anticipated annual requirement of about 370. Consequently, the training facilities at Bangalore will have to be considerably increased and a similar course will have to be started at the National Dairy Research Institute, Karnal, and at the two regional stations (in the East and the West) which are to come into being during the current plan.

*Table 17 gives the staffing pattern for each type of milk project.

The National Dairy Research Institute can turn out 60 graduates annually in B.Sc. (Dairying). Another 25 graduates will be turned out by the Agricultural Institute, Anand. The annual output from the existing institutions will, thus, be 85 against the annual requirement of about 160. The training facilities at Karnal will, therefore, have to be considerably increased.

The present degree course in dairying at the National Dairying Research Institute, Karnal, gives specialised training in dairy technology. We understand that it is proposed to institute a separate course in Dairy Husbandry at this Institute at a later date. This, we feel, should be done as early as possible. Those who qualify at this course, would, after specialisation, become fit to function as district level Dairy specialists.

The requirements of dairy engineers, dairy chemists and dairy bacteriologists, are likely to be met from the existing universities. It will not therefore be necessary to make any special arrangements for the training of such personnel, except for in-plant training which can be organised in the various milk supply projects existing or those to be established during the Second Plan period.

CHAPTER VI

FISHERIES

Introduction

6.1. Development of fisheries in a systematic manner in India was taken up comparatively recently. Before the First Plan, only a few States had initiated the organization of fisheries work; and even at present, Madras, Bombay, West Bengal, Orissa and Kerala are the only States which have a separate organization for this work. In other States, fisheries work is looked after in the agriculture, or animal husbandry department and the organization and staff for fisheries work are fitted into the pattern of those departments.

6.2. Fisheries schemes in the First Plan related to development of inland and marine fisheries. Schemes of inland fisheries were directed towards bringing more water under fish culture, utilizing derelict and fallow waters, increasing the supply of fish seed and bringing large lakes under fish production programmes. Development of marine fisheries was sought by mechanization of fishing craft, introduction of new types of gear, supply of fishery requisites, charting of fishing grounds and provision of facilities for training and marketing. In the Second Plan, besides continuing the earlier programmes, schemes relating to reclamation of marshy areas, development and exploitation of reservoir fisheries, construction of fishing boats, building yards, provision of ice and cold storage plants, transportation, organization of fishermen's co-operatives, development of fishing harbours, training and extension, research, survey and demonstration, were initiated.

6.3. Fisheries work in the earlier years was mostly of an *ad hoc* nature and was formulated to meet local conditions and needs. The modest schemes of fisheries development in the First Plan did not require any large number of qualified persons. Unlike the Agricultural or Veterinary Sciences, there were no special facilities for organized training in Fisheries. The fisheries departments had to recruit persons with degrees or post-graduate qualifications in zoology and/or chemistry and give them whatever training was possible in the department to fit them into administrative and research posts. Even as late as 1940, some of the senior Fisheries Officers in the States of West Bengal, Bombay and Orissa were those who had received *ad hoc* training in this manner in the Madras State. Since 1945 some of the higher personnel for research and development have also been trained abroad. Since the establishment of the Central Fisheries Research Institutions, a few Fisheries Biologists are being trained there to meet part of the requirements of the Central and State Governments.

Broad category of Personnel

6.4. The lack of regular training facilities and the haphazard manner in which the fisheries work developed in the States in the earlier stages led to isolated appointments. Consequently, there was no recognized cadre for fisheries work in most States. Except for a few posts of Assistant Director, Inspector and Demonstrator in some States, most of the posts could not be

brought under any recognized classification. However, an attempt has been made to group these posts under the following broad headings:—

1. Administrative Personnel

- (a) Senior personnel like Deputy Directors, Assistant Directors, District Fisheries Officers and Wardens.
- (b) Junior personnel like Inspectors of Fisheries, Superintendents of Fisheries, Fisheries Demonstrators and Assistant Fisheries Wardens.

2. Research Personnel

- (a) Senior Research personnel like Scientific Officers.
- (b) Junior Research personnel like Research Assistants, Survey Assistants and Laboratory Assistants.

3. Personnel for fishing Vessels

- (a) Senior personnel like Skipper, Master Fisherman, Mate, Bosun and Engine Drivers.
- (b) Junior staff like Assistant Engine Drivers, Deck Hands and Fishermen.

4. Engineers

- (a) Senior personnel like Marine Engineers, Electrical Engineers and Civil Engineers.
- (b) Junior personnel like Assistant Engineers, Supervisors, Draftsmen and Mechanics.

Requirements during Second Plan

6.5 We have collected data about the different types of fisheries posts under the State and Central Governments. An analysis of the data shows that the number of posts sanctioned as in June, 1957 was 770, of which 640 were filled up. The requirements during the years 1957—61 (including vacant posts) will be 630. In terms of the staff classification referred to in para 6.4 the requirements would be as under :—

	<i>Administrative Personnel</i>	<i>Research Personnel</i>	<i>Personnel for fishing vessels</i>	<i>Engineers</i>
Senior	75	50	40	5
Junior	220	100	120	20

Training facilities

6.6. Training in fisheries still continues to be on an *ad hoc* basis. There is no Institution in the country where composite training in the different fishery subjects is provided to prepare candidates for appointment to senior administrative and research posts. Even though "Fishes" is now a special subject for the M.Sc. in some Universities, no University has started a course in fisheries science. The senior personnel have to depend entirely on foreign training after taking a good degree in Zoology in an Indian University. But such facilities are limited as only one or two persons are sent abroad for training annually under foreign aid programmes. The two Central Fisheries

Research Stations in India also train a few persons in fisheries biology along with their normal research work. But this is mainly for meeting their own research needs.

Junior administrative personnel required for inland fisheries work in the subordinate services of the State fisheries departments are trained at the Central Inland Fisheries Research Station, Calcutta. Thirty-five candidates are at present undergoing this training of ten months' duration. As the Government of India have stipulated that the course is to be self-supporting the fees and maintenance cost to students is as high as Rs. 2,400 per year, with the result that it is mostly Government nominees who avail themselves of the training facilities. During the years 1957—61 about 125 candidates can be trained for the junior positions in inland fisheries work in the State fisheries departments. The capacity can, without much difficulty, be expanded, if necessary, but unless the training expenses are reduced this expanded facility may not be fully utilised.

Junior administrative personnel required for marine fisheries are drawn from diploma holders trained at the Polytechnics in Andhra Pradesh, Madras and Kerala. The courses, at these institutions, however, do not give a composite training in all fishery subjects.

Training of senior personnel for fishing vessels like the Skipper, Master, Fishermen, Mate, Bosun and Engine Drivers is, at present, being done only at the Deep Sea Fishing Station at Bombay. The training is for a period of four years intended to qualify personnel for obtaining a certificate issued by the Ministry of Transport. Twelve candidates are at present undergoing this course. The scope for expansion of such training is limited for want of power fishing vessels. In this course twenty marine technologists are expected to be trained during the current Plan period as against the anticipated requirements of 40. While this will not meet the requirements, the shortage will not be sharply felt immediately since some of the bigger fishing vessels for exploitation of off-shore fishery resources are not likely to be acquired due to foreign exchange difficulties.

There are no regular facilities for institutional training for the junior personnel for operating fishing vessels like assistant engine drivers, deck hands etc. However, five States are now giving a short term training of six months for fishermen in navigation, repairs and running of mechanised boats. About 200 fishermen annually receive this training. Another 60 are receiving training in the fishing boats under the Fisheries Community Project jointly sponsored by the Governments of India and Norway and operating in Kerala State. Some of these trainees, with experience, can meet part of the requirements of junior personnel for the Government fishing vessels. With the difficulty in procuring engines for power fishing craft from foreign sources the demand of the private sector for such personnel is comparatively limited. As soon as the position eases this demand will increase and most of the fishermen now undergoing this training would take to private fishing in such powercrafts. However, since this training is of comparatively short duration it should not be difficult to meet the requirements of Government fishing vessels.

Need for a permanent training institution

6.7. The present training facilities particularly for senior personnel for administration, research and for fishing vessels are, thus, not adequate, and can not meet the requirements of the Second Plan. This position was in-

evitable considering that organized development of fisheries is of recent origin and that the programme for the expansion of mechanised fishing was taken up only during the later stages of the First Plan. Designing of suitable crafts and gear for mechanised fishing from small boats also took some time. Now that the preliminary work has been completed and a programme for the development of fisheries has been undertaken it is time that the *ad hoc* arrangements for training of personnel are replaced by a regular system of institutional training to prepare candidates for taking up higher positions in Government and in the industry. A proposal of the Ministry of Food and Agriculture to establish a higher training institution to provide composite training in all aspects of fisheries is, therefore, opportune. The institution will impart instruction in principles of fisheries management, administration of fisheries resources, application of developmental techniques, organization of industrial machinery, supervisory responsibility in fishing fleet operations and other general aspects of the fishing industry. In addition to this composite training, candidates will be given the opportunity to specialise in any particular field. The institution will primarily train personnel for supervisory positions in the administration of fisheries under the Central and State Governments and for managerial positions in the fishing industry. We recommend that the institution should be established early.

Long term objective

6.8. The target of fish production during the current Plan is 14 lakh tons in 1961. The daily requirements of a balanced diet for the Indian population as recommended by the Nutrition Advisory Committee include 2 oz. of fish. Assuming that half the population of the country may eat fish, the quantity of fish, required, if it were available at reasonable price, would amount to 43 lakh tons in 1961. This would increase to 46 lakh tons in 1966. We would be meeting only about a third of this estimated requirements in 1961. There is, thus, considerable leeway to be made up before we can meet our requirements. With 3,000 miles of coastline and innumerable inland waters, the fishery resources awaiting exploitation are fortunately considerable.

The present (1956) estimated production of sea fish in India is about 7 lakh tons, but this is based on coastal operations covering only a narrow stretch of the sea not exceeding ten miles off the shore. The off-shore fish stocks outside the coastal waters are considerable and recent experiments in power fishing have given encouraging results. With a properly organized fishing fleet using modern craft and gear, fish production in the country could be increased several times the present quantity. The objective should be to organize marine fisheries development on proper lines so as to make it possible for Indian capital to start this industry on a large scale with foreign assistance wherever necessary.

Likewise, we have extensive resources in our inland fisheries. The large number of ponds, jheels and smaller lakes offer opportunities for culture of fish on an organised scale. Indigenous practices of fish culture exist in West Bengal, Bihar and Orissa. These are being improved. There is scope for developing inland fisheries throughout the country. Substantial improvement in yield from inland waters can be expected in India. Without artificial manuring an acre of cultivated fish pond could yield 500 to 800 lbs. of fish per annum whereas by manuring and pond management the yield could be increased under Indian conditions, to about 1,500 lbs. The large

number of reservoirs in the irrigation and power projects could also be usefully developed for fish production.

The production target for the Third Plan may be placed at 20 lakh tons in 1966. This is an increase of the order of 8 per cent per year as compared to an average annual rate of increase of about 5 per cent in the level of agricultural production. Considering that our vast fishery resources are yet to be tapped, this target is not high.

Programme during Third Plan

6.9. In the light of what is stated above, the fisheries programme initiated during the current Plan will be continued and further expanded during the Third Plan. Further, special attention will be given to the development of off-shore fishing by co-operative and private enterprise, organisation of effective marketing and distribution and establishment of fisheries industrial units.

OFF-SHORE FISHING

The major development will be in the field of off-shore fishing both exploratory and commercial. It is expected that the Government fishing agencies will handle exploratory fishing, leaving commercial fishing to the private sector. The personnel required to develop deep sea and high seas fishing will be considerable and we will require a large number of master fishermen, marine engineers, boat builders, various ship-hands and specialists in different types of off-shore fishing.

INLAND FISHERIES

In the field of inland fisheries the major development will be in the expansion of fish cultural practices, improvements in some of which have already been accomplished. Fish culture in inland waters will be in all districts where potentialities exist and the extension work in fish culture will be properly organised under the district fisheries officers. Engineering aspects of fish pond construction and development of irrigation reservoirs for lake fisheries will also require attention.

TRANSPORT AND MARKETING

The increase in the output of fish which is expected would require substantial expansion in two major fields of ancillary activities, namely, transport and marketing. As far as increased production of inland fish in ponds and tanks is concerned, they will be consumed within a limited area. The marketing problem will, however, exist in the case of mechanised sea-fishing and in large reservoirs. The present demand for fish in important cities like Calcutta, Bombay, Delhi, Madras, etc., is higher than the supply; hence increased landings of fish will be absorbed in these cities during the next few years. Improvement of marketing in big production and consumption centres would, therefore, be largely dependent on the provision of better facilities for storage, refrigeration, transport and distribution. Pilot projects on these aspects of marketing are already being taken up. The net work of cold storage plants and ice supply plants will be expanded considerably. These will require a number of technical personnel who are familiar with problems relating to handling and distribution of fish.

FISHERIES CO-OPERATIVES

Expansion of fish production from the sea and inland waters and its integration with the existing fishing industry is largely connected with the expansion and evolution of fishery co-operative institutions, which are likely to receive more emphasis in the Third Plan. This again will require specialists at subordinate levels familiar on the one hand with the mechanics of organization and on the other with the application of principles of co-operation to the specialised problems of the fisheries and fishing industries. It is expected that this type of personnel will have to play an important part in the implementation of the Third Plan.

Need for Research

6.10. These programmes would require adequate research support. The work in the Central Marine Fisheries Research Station and the Inland Fisheries Research Station should be intensified. A 50 per cent increase in personnel for biological work may be expected.

The Central Fisheries Technological Research Station, which is being set up during the current Plan period will have to be substantially expanded for paying particular attention to the technological aspects of fish catching, fish handling, fish storage, and of processing and other methods of preservation. A 100 per cent increase in personnel for technological work may be necessary.

Need for organization

6.11. The weakest link in fishery development is on the organizational side. Madras and West Bengal are the only two States which have a fairly satisfactory organisation which descends to a fishery district, which is larger than a normal administrative district. Unless a proper developmental organization exists for organizing central marketing in big centres of consumption, production efforts are not likely to receive sustained stimulus. Developmental work, therefore, assumes considerable importance and it would be advantageous to have Fishery Administrators and Development Officers. We suggest that fisheries development staff should be organized on the basis of fisheries districts which may vary in size from State to State. Such staff should receive the assistance of specialists in different fields. On the basis of our fishery resources it may be necessary to have 200 such district officers and 150 general development officers by the end of the Third Plan.

Third Plan requirements

6.12. Based on these considerations it is estimated that the requirements of senior personnel will be as under :—

	<i>Specialist Personnel</i>		
Fishery culturists	..	..	120
Fishery co-operators	..	..	120
Fishery Technologists	..	..	80
Fishery Engineers	..	..	50
Research personnel	..	..	150
Marine Engineers	..	..	50
Master Fishermen	..	..	50

Fisheries Administrative Personnel required by the end of Third Plan.

District Officers	..	..	200
General Officers	..	..	150

(Table 18 gives the State-wise distribution)

These figures do not include the requirements for lower categories of personnel who do not require specialised training.

Training facilities required

6.13 The training of fish culturists will be given at the Central Inland Fisheries Research Station, Calcutta. New training facilities have to be established for training fishery co-operative personnel and fishery technologists. The fishery engineers could be drawn from the engineering services and given practical training in India and abroad. Research personnel could be obtained through the existing fisheries institutions, Universities and research institutes. Higher training in special subjects should, however, continue to be given in foreign countries to selected persons.

Some difficulty is now being experienced in the training of Marine Engineers and Master Fishermen (senior personnel for the fishing vessels) in adequate numbers. Such personnel are at present given training at the Deep Sea Fishing Station, Bombay and would qualify as Marine Engineers or Master Fishermen only after they have put in four years' training and obtained a Marine Engineering Certificate issued by the Ministry of Transport. So long as this certificate requires a period of training extending up to four years there would be difficulty in getting adequate number of persons trained because of the fewer vessels available with the Deep Sea Fishing Unit. The question of adjustments in this training to meet the special needs of fishing vessels so that a larger number of personnel could be trained in a comparatively short time is now under discussion with the Ministry of Transport. We would strongly urge that the arrangements under discussion to make necessary adjustments in the training may be concluded early so that the existing requirements for obtaining a Marine Engineering Certificate does not stand in the way of providing training for a larger number of people to meet the need of the fishing industry.

If the higher training institution proposed is established towards the end of 1958, we may expect about 200 district officers to be trained by the end of the Third Plan, based on an annual output of 30 Existing departmental agencies would provide 100 officers—50 during the current Plan and 50 during the Third Plan. There will, thus, be about 300 qualified personnel for district and general work by the end of the Third Plan as against the desirable number of 350. The balance will be trained only after 1966. The position will be further aggravated, if the proposed institution is not established.

Foreign training

6.14. As regards foreign training, wherever necessary, we feel that Japan would be most suitable in all fields except fish conservation and management for which training in the U.S.A. would be preferable. The difficulty, however, is, about the language, and the limited extent of training facilities available in Japan under the aid programme. We suggest that the possibility of sending more persons for training in Japan may be explored. The language difficulty might be solved by selecting the right type of persons, teaching them the Japanese language for about an year, and then sending them for training.

CHAPTER VII

FORESTRY

7.1. With the abolition of Zamindari, there is hardly any private forest left except in Kerala, where too the State Legislature has passed a Bill to enable the Government to take over the management of private forests. Thus, the scope for private employment in Forestry is negligible.

Categories of forest personnel

7.2. Technically qualified forestry personnel fall under three categories:

- (a) Superior Forest Service Officers,
- (b) Forest Rangers, and
- (c) Foresters.

Training arrangements

7.3. The training of the first two categories is centralised under the Government of India. The basic qualification required for forest Officers is a first class or a post-graduate degree in science, and that for Rangers Intermediate in science. In practice, however, a good portion of the Rangers are graduates. Forest Officers are initially selected by the State Governments in consultation with their Public Service Commissions and thereafter they are deputed for three years' training at the Indian Forest College, Dehra Dun. Similarly, Forest Rangers are initially selected by the State Governments and deputed for a two years training at the Forest Rangers' Colleges at Dehra Dun and Coimbatore. Admission to the Colleges is thus at present open only to State nominees against guaranteed State appointments. A few candidates sponsored by neighbouring countries are also accepted for training. Training arrangements are so made that within limits they can be increased or reduced to fit in with the needs of the States as forecast by them from time to time.

Progress of training

7.4. It was estimated that during the Second Plan period, facilities would be required to train 250 Forest Officers and 700 Rangers. The normal turnover of the Indian Forest College during the Second Plan period was estimated at about 160 and of the Rangers' Colleges at 600. The annual intake capacity of the Indian Forest College was, therefore, increased from 40 to 80 as from 1956 to provide for an additional output of 120, and of the Southern Rangers' College at Coimbatore from 40 to 80 to provide for additional output of 160. The States' requirements as forecast in September, 1956 were, however, only for training about 230 Forest Officers and 600 Rangers. While the increased capacity was almost fully utilised in 1956, the actual allotment of seats in 1957 at the Indian Forest College, according to the State's requirements, has fallen short of the full capacity. This position is likely to continue since the States' needs (as forecast—36 in 1958, 33 in 1959 and 30 in 1960) have tended to decrease towards the later stages of the current Plan period. Even after allowing for a few seats (say 6 or 7) a year from 1958 for training men to replace the existing officers to be appointed to the proposed Central Forest Service and after

providing for officers required for soil conservation work, the existing capacity would appear to be adequate to meet the needs of routine work as well as development schemes under the current Plan.

Admission of private candidates

7.5. So far, admissions to the colleges have been restricted to State nominees with guaranteed appointments. We would suggest that the surplus capacity in any year after meeting the requirements of the States need not be left idle, but should be fully utilised by offering admission to private candidates, and if necessary, by giving them fee concessions on more or less the same lines as are now allowed to candidates from foreign countries, so that these candidates, although they would not be guaranteed appointments, might be drawn upon if necessity arose.

Third Plan requirement

7.6. Requirements of personnel for the Third Plan cannot be directly correlated to any increase in production, as forestry schemes are long-term undertakings. The assessment has, therefore, to be based on permanent objectives on the organisational side and on what would be capable of achievement in the Third Plan period on the development side. For calculating the organisational requirements of the Forest Departments in the country a divisional charge, on an average, may be limited to a thousand square miles, and a range charge to 140 square miles. The provision for research, demarcation, and working plans has, so far, been inadequate. This should be remedied under the Third Plan. On the development side too, we expect that increased work would be undertaken in the Third Plan period, specially in respect of forest plantations and rehabilitation of denuded areas (to augment fuel and fodder resources).

Training facilities in Third Plan

7.7 Based on these considerations, it is estimated that the trained personnel required during the Third Plan period, excluding replacements to the proposed Central Forest Service and the requirements of soil conservation work, would be about 59 Forest Officers and 130 Rangers for all types of forestry work. Replacement to the proposed Central Forest Service and additions that may be necessary to increase the strength of that cadre would be about 15 Forest Officers annually. In addition, 6 trained Forest Officers and about 30 Rangers would be required every year for soil conservation work. The total annual demand in the Third Five-Year Plan period would thus be about 80 Forest Officers and 160 Forest Rangers after making necessary allowance for leave reserve (Table No. 20). The present training facilities for the admission of 80 candidates a year in the officers' course and 160 candidates a year in the Rangers' course are, therefore, adequate to meet the expected demand. However, as the availability of trained Forest Officers and Rangers in the first year of the Third Plan would depend on the actual admissions in the year 1958 in the Forest College and in 1959 in the Rangers' College, respectively, it would be necessary to ensure that the admissions to the 2 Colleges in these 2 years do not fall below the requirements, as mentioned above.

Foresters

7.8. Foresters are trained by the States in Forest Schools run by them or by adjacent States. Assam, West Bengal, Bihar, Orissa, Uttar Pradesh, Punjab and Bombay have one school each, while Madhya Pradesh has two such schools. In addition, the Government of India conducts a Foresters' Course at the Forest College, Coimbatore for the benefit of Madras, Kerala, Mysore and Andhra Pradesh. In all these schools, the course is of approximately one year's duration, and the annual intake capacity can be increased up to 400 students per year. The total cadre of Foresters and Deputy Rangers is likely to be in the vicinity of 9,000 persons and no difficulty is expected in training annually the country's requirements of 350 to 400 students per year.

Forest Industries

7.9. The training programmes stated above refer to the requirements of Forestry only and not to those of forest industries, such as saw mills, plywood factories, match factories and paper mills. While some of the technological institutes in the country may be expected to give basic training in saw mill and other mechanical equipment, wood working, carpentry, etc., the bulk of the training is done in a practical way in the industries themselves. For higher technological work, as in the plywood or paper industry, the Forest Research Institute organises *ad hoc* courses of training at which 6—12 men with necessary basic qualifications are accepted for a 6—12 months' course at a time. These courses are flexible and could be expanded if need arises.

The personnel required to be conversant with timber, for instance, Railway Engineers, are given short courses (6 weeks) of training especially in the identification, strength, properties, working qualities, etc., of Indian timbers.

Foreign training

7.10. The entire forestry training is given in India. Consequently, opportunities do not exist for forest officers to see modern advancements in forestry, particularly with regard to forest industries which have made great strides in other countries. It is necessary, therefore, that the various foreign fellowship schemes should be utilised for sending a few officers each year for useful advanced and specialised courses in forestry to countries where facilities for such courses are available so that they could bring back experience and knowledge of modern trends.

CHAPTER VIII

SOIL CONSERVATION

Nature of Erosion problem

8.1. Soil erosion is the most serious prevalent disease of the land. Vast areas have been so damaged that they no longer can be used to grow anything of value to human beings. Much of the good land that remains is in danger from over and improper use. Problems of soil erosion exist in different forms in different parts of the country owing to wide variations in soil, climate, topography and present land use. The ever-increasing pressure of population on land tends to increase the severity of the problem. More lands are being brought under cultivation to meet the increasing demands of food, fuel and fibre. So long as land is well covered by vegetation, the risk of erosion is the minimum; when the land is brought under the plough, without proper soil conservation measures, hazards of erosion increase, resulting in reduced productivity.

Even uncultivated lands are not free from erosion owing to over-grazing and over-felling of trees. Sand washed away during the monsoon silts up drainage channels, dams and reservoirs and also gets deposited on fertile lands.

In uncultivated and unprotected fallow lands soil erosion very often leads to extreme gully formation which encroaches on the adjoining cultivated lands. Further, due to mismanagement, such as faulty irrigation practices without provision of a drainage on arid and semi-arid lands, development of undue salinity and alkalinity occurs rendering large areas unfit for cultivation.

In highly arid regions over-grazing, indiscriminate cutting of forest trees and improper land use have resulted in formation of vast desert areas which are not only unproductive but are also a constant menace to the adjoining areas. All these gradually and continuously sap the fertility of the soil and consequently reduce agricultural production.

To keep the land productive a good conservation programme is therefore necessary. The programme is essentially one of (1) contour bunding, (2) regeneration of grass-lands, (3) afforestation of waste areas and (4) reclamation of alkali and saline lands.

Extent of Erosion

8.2. In order to plan proper soil conservation measures on a country-wide basis it is essential to have a rough estimate of the extent and severity of the problem.

By and large the greatest problem lies in the agricultural areas where least amount of protection to land is provided by seasonal crops. The net areas sown in India (according to 1954-55 statistics) is about 315 million acres. Although all agricultural lands require a certain amount of soil conservation measures the greatest attention is to be paid to the sloping lands which constitute most of the lands in Peninsular India, Himalayan and Sub-Himalayan regions of Northern India, red and laterite soils of Bihar, Orissa and West Bengal, and the black soil regions of Central India.

The research data in Bombay-Deccan area (Peninsular India) are illustrative. Experiments conducted at Sholapur reveal that on an average 37 tons of soil, per acre, per year, are lost from agricultural lands on a moderately sloping land. This means that nearly 7 in. of top soil are being washed away in a period of 27 years. Losses of plant nutrients are also colossal. A rough estimate on the 5.4 million acres under rabi jowar crop showed a loss of about 300,000 tons each of nitrogen and phosphorus, and about ten times this quantity of potash, which in terms of crop production amounts to 11, 47 and 91 million tons of jowar when all the three principal elements are considered separately. A sample survey conducted over 80,000 acres at random indicates that about 32 per cent of the area has got soil depth of less than 9 inches and 39 per cent area a depth of between 9 inches and 18 inches. The soils below 9 inches hardly produce any crop under low rainfall, and can be considered as unfit for cropping.

Another survey conducted on the basis of land record figures indicates that over a period of 75 years in about 17 per cent of this area, the depth of the soil was reduced from 9 in.—18 in. to less than 9 in. These data point out that unless suitable soil conservation measures are adopted, a vast proportion of the now productive areas will automatically go out of economic production.

According to 1953-54 land utilisation statistics the net cropped area in the problem regions of Peninsular India, the black cotton soils of Central India, the Himalayan and Sub-Himalayan regions and the red and laterite soil zones of eastern India was about 197 million acres. Of this, the areas under paddy and other irrigated crops do not present any serious soil conservation problem. Of the remaining 143 million acres it is assumed that at least 100 million acres will require intensive soil conservation measures such as contour bunding and dry farming. The urgency of undertaking soil conservation measures on this problem area is also emphasised in view of the increased yields which will accrue. (Appendix III gives details of this area).

The total area of non-agricultural lands, which include current fallow uncultivated lands excluding those in Rajasthan, Saurashtra and Kutch, comes to about 105 million acres (Appendix IV). About half this area or 50 million acres, will need soil conservation measures for the protection of agricultural lands adjoining these areas. Some of these areas, which are alkaline or saline, will require reclamation, while for others afforestation including 'Cho' training may be the only solution.

In addition to the above there are about 50 million acres of the Rajasthan desert which require soil conservation measures for stabilising it. Regeneration of grass lands by closure and rotational grazing, creation of shelter belts, and wind strip cropping will not only help to rehabilitate this desolate waste land but also will substantially add to the fodder and food wealth of the country. Thus the total area of non-agricultural lands requiring treatment, comes on a moderate estimate, to about 100 million acres.

There is also need for soil conservation measures in the catchment areas of the major river valleys. No exact statistics can be given for these as some of these areas have already been included in the agricultural and non-agricultural lands mentioned above.

In view of the foregoing analysis a target of 200 million acres appears to be the minimum where soil conservation work should be concentrated during the next 25 to 30 years.

Work of Soil Conservation Board

8.3. Soil conservation work was begun on systematic lines in the country during the First Five Year Plan when a Soil Conservation Board was set up. Some preliminary research in soil conservation measures suitable to Indian conditions had been done in some States through research schemes sponsored by the Indian Council of Agricultural Research. The result of these researches was available to the Soil Conservation Board, whose primary function is to sponsor projects in the States to prevent soil erosion, and heal its scars where it has not advanced too far to respond to curative methods. It also organises research work in this field and arranges training programmes.

Training during First Plan

8.4. To meet the need for trained personnel, about 250 agricultural and forest officials were trained by the States in soil conservation methods during the First Plan period. The area covered by soil conservation practices during the First Plan period was nearly 7 lakh acres.

Requirements during Second Plan

8.5. Under the Second Plan, soil conservation work has to be undertaken in a concerted manner on nearly 3 million acres in tracts which are seriously affected by soil erosion. The basic objective is to organise the work on a regional basis with regional research, demonstration and training centres in all major soil regions. It is estimated that the programme would require nearly 5,200 technically trained personnel of different grades:

		<i>Estimated requirement for Second Plan</i>	<i>Estimated to have been at the beginning of Second Plan</i>
Officers	..	200	40
Assistants	..	1,000	170
Sub-Assistants	..	4,000	300

Progress of Training officers

8.6. To meet the requirements of trained personnel, the Government of India opened a training centre at Dehra Dun for giving special training in soil conservation for one year to officers selected from experienced forestry, agricultural and engineering staff of the State Governments. 48 Officers were trained at this centre during 1955-56 and 1956-57, and 18 officers are now under training (1957-58). Taking into account the trained officers available at the beginning of the Second Plan, an additional 100 trained officers would be required. The State Governments have to take steps to depute at least 50 officers each year, during 1958-59, 1959-60 and 1960-61 if the planned programme has to be completed. The officers admitted during 1960-61 would be available for duty in the first year of the Third Plan. The centre is at present equipped to train 20 officers at a time, but the facilities can be easily expanded to cater for about 50 per year.

Progress of training Assistants

8.7. Four centres have been opened by the Government of India at Kotah, Bellary, Ootacamund and Hazaribagh, for training personnel under the category "Assistants". Graduate Agricultural Assistants, Forest Rangers and Engineering Diploma holders nominated by the State Governments

undergo this training of six months' duration. Two courses are held annually at these centres and 20 Assistants can be admitted to each course. Thus, the present capacity of the four centres together is 160 Assistants per year. About 300 Assistants have so far been trained and about 70 are under training. The remaining 460 Assistants could be trained if the admissions to the four centres are increased from 80 to 140, which is feasible. The increased admissions should take place from the course commencing in August, 1958 as the trainees admitted to the course to be held in August, 1960 would qualify only after the end of the Second Plan.

8.8. While these training facilities on the lines indicated for expansion, are adequate, even the existing capacity is not being fully utilised by the State Governments, who do not depute sufficient numbers of departmental candidates for training. In view of the difficulty in securing adequate numbers of departmental officers for training and to have larger number of personnel trained in soil conservation, the State Governments have been authorised to nominate fresh agricultural and science graduates, and diploma holders in engineering against guaranteed appointments. The Government of India have undertaken to subsidise expenditure on this account to the extent of 75 per cent. This relaxation and concession should enable the States to depute for training a larger number of persons in future. But even so we consider it necessary to recommend that the condition regarding guaranteed appointments should be relaxed. Preference may be given to those selected by the State Governments against guaranteed appointments; but any vacancies still left should be offered to private candidates without the guarantee of appointments. A suitable stipend may be necessary to attract such candidates.

Refresher Course

8.9. A short refresher course of three months' duration is also at present arranged at Dehra Dun for the benefit of Administrative Officers of the Revenue, Co-operation, Community Projects, National Extension and Land Development Departments of the States and its continuance as a long-term arrangement would be very useful.

Progress of training Sub-Assistants

8.10. Sub-Assistants are trained by the States at centres run by them. There are 10 such centres and 15 more are in the process of establishment. 1,000 Sub-Assistants have been trained so far. It is hoped that the required number of Sub-Assistants will have been trained by the end of the Second Plan.

Requirements of personnel in Third Plan

8.11. The requirements of trained personnel for soil conservation work during the Third Plan period would be influenced largely by the machinery that will be built up at the end of the Second Plan, and the rate at which soil conservation measures are desired to be executed during the next Plan. It has been estimated that a unit consisting of 1 Officer with 5 Assistants and 20 Sub-Assistants would be able to handle soil conservation work in 5,000 acres in a year. If the training programme initiated during the Second Plan period is geared up, and the training centres complete the programme as envisaged, the personnel built up during the Second Plan period would be able to undertake soil conservation work during the Third Plan period, over an area of 6.25 million acres. During the Third Plan period

training facilities should be progressively increased to train additional 3,000 officers, 1,700 Assistants and 6,800 Sub-Assistants. The additional staff would be able to cover an area of 3.0 million acres and the total staff built up at the end of the Third Plan would have covered an area of 9.25 million acres, as in the table below :—

<i>Plan Period</i>					<i>Staff trained in working Units*</i>	<i>Area that will be covered by soil conservation measures during the Third Plan (in million acres)</i>
At the start of Third Plan (1961)	..	..	..	..	250	$250 \times 5,000 \times 5 = 6.25$
1961-62	..	..	..	..	50	$50 \times 5,000 \times 4 = 1.00$
1962-63	..	..	..	..	60	$60 \times 5,000 \times 3 = 0.90$
1963-64	..	..	..	..	70	$70 \times 5,000 \times 2 = 0.70$
1964-65	..	..	..	..	80	$80 \times 5,000 \times 1 = 0.40$
1965-66	..	..	..	..	30	(will be available for 1966-67 only).
TOTAL ..						9.25

*One working unit comprises of one Officer, Five Assistants and 20 Sub-Assistant to manage 5,000 acres.

The existing centres, with a little expansion of their facilities, together with the additional centres for Sub-Assistants being set up during the current Plan, should be adequate for training this personnel during the Third Plan period.

Requirements related to basic training

8.12. The Officers and Assistants numbering about 2,000 to be deputed by States for training in soil conservation would be drawn from Agriculture, Forestry and Engineering Departments. Of these, a majority will be graduates in agriculture or in pure science subjects and the rest superior Forest Officers, Forest Rangers and graduates or diploma holders in Engineering. In the Chapter in Agriculture, provision has been included for 1,000 Agricultural graduates for soil conservation work. Similarly, under Forestry, provision has been made for an annual training of 6 to 7 Superior Forest Officers and about 30 Forest Rangers. Requirements of Agricultural Engineering graduates have similarly been included in the Chapter on Agricultural Engineering.

There will be no dearth of personnel for appointment as Sub-Assistants as the basic qualification required is only Matriculation.

Magnitude of Soil Conservation problem

8.13. Soil conservation programme is still in its infancy in India. With the increasing recognition it is receiving as a measure of preserving soil fertility and thus contributing to higher levels of agricultural production, the tempo of soil conservation work is bound to increase, and a forward look beyond the Third Five Year Plan would not be out of place. The First Five Year Plan had recommended the enactment of legislation to give power

to Government to execute specified improvements, and allocate the costs between Government and cultivators; to constitute co-operative organisations for soil conservation; and to restrict uses and practices in areas declared as "protective areas". Legislation is under consideration in the States to empower State Governments to set up Boards which can prepare plans for soil conservation and land improvement, and to deal with local and regional soil conservation problems. All these point to the conclusion that the recruitment and training of soil conservation personnel would require to be lifted from the present rather temporary and make-shift arrangements and placed on a sound and permanent basis. There should be steady flow of basically qualified staff into the different training centres, and the optimum utilisation of the training facilities provided should not be allowed to be hampered by the difficulties experienced by the State Governments in drawing for training staff from the cadre of the Agriculture, Forestry and Engineering Departments. If necessary, provision should be made in these cadres to meet the increasing demands of the rapidly developing soil conservation programme.

The training facilities should be increased progressively during the Fourth and Fifth Plan periods to train staff for 260 working units in the last year of the Fifth Plan. It should be feasible to achieve this target with some expansion of the training facilities at each centre. Training programme after the Fifth Plan may be confined to replacement requirements as the available personnel would be able to cope with the work load under the Sixth and Seventh Plans. The following table shows the rate at which the staff for soil conservation work will increase, and the area that will be covered.

<i>Plan</i>	<i>Estimated staff Provision (in working units)</i>	<i>Acreage covered (in million acres)</i>	<i>Progressive acreage covered (in million acres)</i>
End of Second Plan (1956—61) ..	250	3.50	3.50
Third Plan Period (1961—66) ..	340	9.25	12.75
Fourth Plan Period (1966—71) ..	610	19.95	32.70
Fifth Plan Period (1971—76) ..	1100	40.00	72.70
Sixth Plan Period (1976—81) ..	No training	57.5 with the available	130.20
Seventh Plan Period (1981—86) ..	do	57.5 personnel	187.70
(Ultimate target 200 million acres)			

With experience it is likely that each unit may cover more than 5,000 acres assumed in these calculations. Similarly as the farmers realise the benefits of soil conservation measures their co-operation would lead to a more rapid coverage. It is realistic, therefore, to assume that the gap of about 12 million acres may be covered in the Seventh Plan period itself.

Need for permanent additions to cadre

8.14. The large number of trained personnel required can be found only if permanent additions are made to the cadres of the departments concerned, in order to provide annually the officers to be deputed for training in soil conservation and to be posted subsequently for soil conservation

work. In the alternative a separate soil conservation cadre may be formed. We would recommend serious consideration being given to this matter.

Introduction of Soil Conservation as a separate subject

8.15. Similarly, the introduction of soil conservation to form a separate subject of teaching in the curricula of the Agricultural, Forestry and Agricultural Engineering Colleges in the country, would help to provide personnel well-equipped to undertake soil conservation training in future years. With the availability of such graduates, it may even be possible to shorten the duration of the training courses at the *ad hoc* training centres. We recommend these ideas for consideration.

Training of key Personnel

8.16. A rapidly developing Service of the size and magnitude indicated above, would require proper leadership at higher levels for planning, direction and supervision. We feel that it would be appropriate from now on to select promising officers and give them suitable training in India and abroad to hold key positions in this important service.

Employment potential

8.17. Soil conservation, apart from being a measure of defence and restoration of soil productivity, leading to increased agricultural out-put, will provide a great potential for gainful rural employment. Each million acre that will be protected by soil conservation measures will provide 20 million men days of employment.

CHAPTER IX

AGRICULTURAL MARKETING

Introduction

9.1. In an agricultural country like India, orderly marketing of surplus farm produce is most important. Investigation into and improvement of marketing conditions of agricultural, livestock and allied products commenced in India in 1935 with the setting up of the Directorate of Marketing and Inspection at the Centre and Marketing Departments in the States. By developing agricultural marketing, it is sought to reorganise the existing system to secure for the farmer his due share of the price paid by the consumer, and to make it serve the needs of a planned economy. These objectives are sought to be achieved through market research comprising market surveys and studies and analysis of price spreads, standardisation and grading of commodities, quality control and inspection, regulation of markets and market practices, and market credit; and development of marketing, processing, warehousing, etc., on a co-operative basis. This chapter deals with the requirements of trained personnel for market research, standardisation and grading, and regulatory functions. Requirements of personnel for the development of marketing, processing and warehousing on a co-operative basis are discussed in the chapter on 'Co-operation'.

Programme for Second Plan

9.2. The Central marketing schemes included in the Second Plan relate to market surveys and research, expansion of quality control work, promotion of grading of agricultural commodities, development of 'regulated markets' and provision of training facilities for State marketing personnel. The State Marketing Schemes mostly relate to strengthening of staff and extension of regulated markets.

Personnel required

9.3. The requirements of graduate technical personnel during 1957—61 are estimated at 430 (Table 23).

Marketing personnel are recruited from graduates in agriculture, the pure sciences, economics, or commerce and will be available to the extent required.

Training in Marketing

9.4. The trainees are deputed by the State. The Central Marketing Directorate gives one year's training in agricultural marketing. Twenty candidates were trained in 1956-57 and 16 are under training. The centre is equipped to train 30 candidates at a time, but the State Governments are reluctant to sponsor more candidates because of the high cost of training—Rs. 5,000 to 6,000 per candidate on account of pay, allowances, tour expenses, etc. We were informed that the surplus capacity was now being utilised by admitting private candidates also.

The number of regulated markets which was 400 at the end of the First Plan is likely to increase to 1,000 by the end of the Second Plan.

A four months' course for the training of Market Secretaries required for managing 'regulated markets' is given at Sangli. Another centre is being established at Hyderabad. The centres are equipped to train 25 candidates at a time, but the facilities can be increased and new centres also opened, if necessary, depending upon the progress in the establishment of regulated markets and availability of candidates.

Training facilities are, thus, adequate and subject to an adequate number of deputationists from the states, the requirements will be fully met. The surplus capacity, after meeting the requirements of the states, should continue to be utilised for admitting private candidates.

Assessment for Third Plan

9.5. Development of marketing is vital for providing the necessary incentive to farmers, through increased returns. With increase in production the quantity of marketed surplus is bound to increase. It should be our endeavour to provide an organisation capable of handling this increase. An adequate organisation, established in its full strength from the outset, will be necessary to handle the annual increase in production.

The assessment made in the following paragraphs is, based on this general objective on the organisational side, and on programmes of work likely to be undertaken under the Third Plan.

Personnel for Organisation in the State Departments

9.6. For a proper supervision of regulated markets, and for undertaking other activities such as grading, organising co-operative marketing and warehousing, and educating the producer-seller, state marketing departments have to be properly organised. The staffing of the state departments in the Third Plan period should be on the basis of one Assistant Marketing Officer, class II, and two Inspectors for each district; and one senior class I officer for every 10 districts. On this basis, the requirements of graduate personnel for the state marketing departments will be 630 (Table 24).

Personnel for regulatory functions

9.7. With an increased turnover of marketable farm produce anticipated during the Third Plan period, internal grading activities relating to food-grains, oilseeds, cotton, etc. (which will be handled by the warehouses), and to other agricultural commodities such as fruits, vegetables and dairy and livestock products would need to be intensified. This will require additional grading laboratories and expansion of the Central Control Laboratory and the regional laboratories. To ensure that the grade-standards are properly adopted and followed, the inspection service will also require strengthening. All wholesale markets are likely to be brought under the purview of the Agriculture Produce (Markets) Act. Regulated markets would be assisted in developing market yards. Studies will be undertaken for periodically assessing shifts in market trends, marketing costs, etc.

The requirements of graduate technical personnel for the Central Directorate for implementing the above programme is estimated at 70.

A good portion of the marketable farm produce will be received by regulated markets and handled by co-operatives and warehouses. For

pooling of the produce by the co-operatives and for a smooth operation of the warehouses, it would be essential to assess, on the basis of statutory grades, the quality of the farm produce that would be brought to those institutions. To promote sale of produce after proper grading, the regulated markets, co-operatives and the warehouses will have to employ properly trained Grading Assistants/Assessors. About 1,000 such Assistants/Assessors are likely to be required. It is not necessary to have persons with a basic degree to hold these posts. Desirable qualification would be intermediate in science or training in an agricultural school after matriculation.

Requirements in relation to basic training

9.8. The total additional requirements of graduate technical personnel for the Centre and the States during the Third Plan period would thus be about 700. Of these about 330 would need to be graduates in agriculture with specialisation in agricultural economics, and the rest graduates in the pure sciences, commerce, or economics. Of the 330 graduates in agriculture, about a 100 would need to have post-graduate degrees in agricultural economics. This requirement of agricultural graduates has been included in the chapter on Agriculture. Requirements of holders of post-graduate degrees are being taken into account in the chapter on Agricultural Economics'.

Facilities for in-service training

9.9. Facilities required for training in Marketing are indicated below:—

(a) *Grading Assistants/Assessors*—No arrangements have been made for giving this training during the Second Plan period. With the setting up of warehouses and development of co-operative marketing, the need for starting training centres for such personnel is obvious. The eight regional laboratories being set up for quality control of graded produce may be utilised for giving this training, which should be of nine months' duration. About 1,000 Grading Assistants/Assessors could be trained in the course of five years at the rate of 25 for each course per regional laboratory.

(b) *Market Secretaries*—About 350 Market Secretaries would be trained during the Second Plan at the two centres at Sangli and Hyderabad. The number of regulated markets will increase from a 1,000 by the end of the Second Plan, to 1,800 during the Third Plan period. It would, therefore, be necessary to provide for two more training centres, one in the northern region and the other in the eastern region.

(c) *Training of personnel of State Marketing Department*—No special training arrangements would be necessary for the senior officers (Class I) who would be mostly experienced men promoted from the lower grades. We, however, suggest that they may be sent in batches of four to six each year to foreign countries on study tours for a period of 3 to 4 months under the various foreign aid programmes. They will thus broaden their outlook and get acquainted with modern techniques of marketing followed in economically advanced countries.

The supervisory staff numbering 50 for inspection of grading centres would require comprehensive training for about a year. This training could be arranged at the Central Control Laboratory at Nagpur in batches of 10 per year.

Regarding the training of the remaining State marketing staff, we suggest that the Government of India should provide facilities only for the district officers who would be mainly responsible for developmental work in the districts. The number of district officers required by the end of the Third Plan is 320, of whom about a 100 would have been trained by the end of the Second Plan. The remaining 220 could be trained by increasing the present capacity of the centre from 30 to 40.

(d) *Training of personnel of the Central Marketing Directorate*—No specific arrangements for in-service training would be needed. The officers will be recruited from the open market, and such training as may be necessary will be given by the senior officers as a part of their normal duties. It may, however, be necessary to depute every year one senior officer to some foreign country on a study tour.

Refresher training of, say, one to three months' duration, will, however, be needed for these personnel, and they may be attached to each of the nine laboratories and grading centres in batches for intensive training in specified aspects of agricultural marketing.

Requirements of personnel for the Fruit and Vegetable preservation industry

9.10. With increasing development of horticulture and need for more protective foods there would be considerable scope for the growth of the fruit and vegetable preservation industry both on a cottage industry and on a large scale.

The requirements of trained personnel for this purpose would be governed by the following considerations. During the Second Plan period, it is proposed to increase the annual production of fruit products from 20,000 tons to 50,000 tons by 1960-61. The target for the Third Plan may be set at 1,00,000 tons by 1965-66. This would mean the employment in the industry of a considerable number of trained personnel. The requirements of the industry, it is estimated, would be about 250 technicians.

To popularise the techniques of preserving fruits and vegetables on a cottage industry basis, it is necessary to impart training to producers in those Community Development and National Extension Service Blocks where horticulture is of sufficient importance. It is estimated that 400 centres may be opened during the Third Plan period for imparting this training, which may be done at the Home Science Training Centres, agricultural colleges and schools, and girls' colleges and schools. These centres would require about 400 teacher-demonstrators.

The Central Marketing Organisation and the research stations which will have to train the teacher-demonstrators, and give guidance on technical matters to a large number of manufacturers will also need some additional staff. The graduate technical personnel required for this is estimated at about 50.

The total requirements of technical personnel would, thus, be of the order of 700. While most of these would be graduates in science or in food technology, or diploma holders in food technology, a small number may be drawn from agricultural graduates, wherever available. We are not, however, making any specific provision for the small number of agricultural graduates who may be required, as these could be had from the increased total output of graduates proposed by us.

In-service training for these personnel could be imparted at the five regional stations.

Training at the post-graduate level is now being imparted at the Central Food Technological Research Institute, Mysore, where about 10 candidates are admitted annually for a two-year course in food technology for the Associateship of the Institute. The facilities may have to be increased to meet the additional requirements under the Third Plan. The facilities available at some Polytechnics and at some Universities may also be utilized.

With the expansion of the fruit and vegetable preservation industry, there will be need to adopt modern methods of processing, packing and marketing. It will, therefore, be desirable to send one or two senior officers every year to foreign countries to acquaint themselves with the latest developments in the technology of fruit processing.

CHAPTER X

CO-OPERATION

Long-term objective

10.1. The First Conference of State Ministers of Co-operation, held in 1955, approved of the long-term objective of organizing rural business on a co-operative basis, so that within 15 years 50 per cent of the total business, credit, marketing, processing, etc., would be co-operative.

Second Plan targets in the Co-operative Sector

10.2. The principal targets for the Second Plan are:—

- (a) to meet 25 per cent of the total agricultural finance needs by 1960-61, and
- (b) to handle ten per cent of the marketable surplus through co-operative agencies.

These targets are sought to be achieved through an integrated programme of co-operative development embracing credit (linking credit and non-credit societies), marketing, processing, warehousing and storage, with State partnership with co-operative institutions at various levels. The number of large-sized co-operative credit societies is to be increased to 10,400. The targets for short-term, medium-term and long-term co-operative credit have been fixed at Rs. 150 crores, Rs. 50 crores and Rs. 25 crores, respectively, as against Rs. 30 crores, Rs. 10 crores and Rs. 3 crores, respectively, in the First Plan. The target for short-term credit may be increased in view of the recent increase in the targets of agricultural production. In the sphere of marketing and processing, 1,800 primary marketing societies are to be organized in addition to 35 co-operative sugar factories, 48 co-operative cotton gins and 118 other co-operative processing societies. Co-operative warehouses and godowns with a storage capacity of 20 lakh tons are being set up. These will enable the cultivators to store a sizeable part of their marketable surpluses, and at the same time to obtain short-term credit on the basis of the warehouse receipts.

Training of co-operative personnel role of the Central Committee

10.3. In 1953, the Government of India and the Reserve Bank jointly constituted a Central Committee for Co-operative Training and entrusted to it the responsibility for establishing the necessary training facilities. The Committee has made arrangements for training the following categories of personnel:—

- (i) Senior personnel: this category includes officers of the rank of Assistant Registrars and above (gazetted class II) and persons holding key positions in important co-operative institutions such as Central Co-operative Banks, Apex Co-operative Banks, bigger marketing societies etc.;
- (ii) Intermediate category personnel: this category includes:
 - (a) Regular non-gazetted graduate personnel of the State Departments of Co-operation, such as Inspectors, Circle Auditors and Sub-Registrars, and personnel of Co-operative Institutions such as Managers of Co-operative Marketing Societies and Managers of Land Mortgage Banks; and

(b) Block Level Co-operative Officers for manning the N.E.S. Blocks.

(iii) **Junior Co-operative Personnel:** this category includes Managers of large-sized credit societies, Supervisors of Credit Societies and Marketing Societies, etc.

Senior personnel are trained at the Co-operative Training College, Poona; Intermediate personnel of the regular category are trained at five Regional Co-operative Training Centres; Block Level Co-operative Officers are trained at eight centres specially set up for the purpose, and Junior Personnel in 45 schools functioning in the various states.

Progress of training

10.4. The progress of training is reviewed below:—

[illegible]

10.5. Facilities for training co-operative personnel are thus adequate to meet the requirements of the Second Plan. The programme for the training of technical personnel required for warehouses and for co-operative farming is under separate consideration.

Education of Office-bearers and members of co-operative societies

10.6. The education of office-bearers and members of Co-operative Societies is being taken care of under a scheme sponsored by the All-India Co-operative Union. The number of persons to be educated and trained during the Plan period will be as under:—

(a) Office-bearers	30,000
(b) Members of Managing Committees ..	1,50,000
(c) Members and potential members of societies	7,50,000

Training units have been set up at 55 centres in the N.E.S. areas. It is proposed progressively to set up more centres—one in each district—so as to cover the entire country by the end of the Second Plan. The office-bearers (Presidents and Honorary Secretaries) of the societies are given a course lasting six weeks. The course for the Members of Managing Committees is of 7 to 10 days, and that for ordinary members and potential members of three days.

Third Plan targets in the Co-operative Sector

10.7. It is expected that, by 1960-61, about 20 per cent of the agricultural finance will be provided by the Co-operatives and the target of ten per cent marketable surplus will have been achieved. Based on the long-term objectives approved at the Conference of State Ministers of Co-operation held in 1955, the Co-operatives should aim, in the Third Plan, at providing 40 per cent of the Agricultural finance, and 25 per cent of the marketing of farm surplus. They should also aim at meeting 50 per cent of the supply needs for commodities essential for agricultural production and domestic use. In the sphere of co-operative farming, the National Development Council has recently approved of a proposal to launch 3,000 experiments. Of these, provided funds can be made available, 600 are to be started in 1958-59. In the Third Plan period, the number of Co-operative farms to be set up may go up to 10,000 or more. For our purpose, we have assumed a target of 10,000 only.

Third Plan personnel requirement

10.8. The measures necessary to achieve the targets outlined above and the personnel required to implement the measures are discussed below:—

I. CREDIT

(i) Large-sized societies

In addition to 10,400 large-sized credit societies to be set up under the Second Plan, 10,000 such societies may be organized during the Third Plan period. The existing small-sized societies, numbering around 1.5 lakhs, may also have to be strengthened and reorganized. The total requirements of staff at field level will be:—

(a) Managers of new large-sized societies ..	10,000
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(b) Additional staff for the large-sized societies to be organized during the Second Plan period on account of expansion of business ..				5,000
(c) Supervisors for large-sized societies ..				700
(d) Auditors for large-sized societies ...				400
(ii) <i>Small-sized societies</i>				
Supervisors	..	..	..	1,000
(iii) <i>Central Banks</i>				

A large volume of business will be canalized through co-operative banks. On an average, every co-operative bank will provide credit annually of the order of one crore of rupees. The banks will also promote schemes for thrift and savings. For dealing with the increased work, they will require 1,000 trained hands.

(iv) *Apex Banks*

The Apex Banks will also have to engage 100 persons as additional staff to deal with the extra work.

(v) *Land Mortgage Banks*

Land Mortgage Banks have not made much headway so far. Long-term finance will receive special attention during the Third Plan period. In every district, at least two additional field workers (such as valuation officers) will be employed for looking after the work. The requirements of staff will be 600.

II. MARKETING

The 1,900 marketing societies established during the Second Plan period will expand their business. They will require about 3,000 persons more. In addition, about 600 to 1,000 marketing processing societies will have to be organized in the Third Plan period, so that every important *mandi* has a marketing society. They will need about 3,000 workers. For proper supervision and inspection of the marketing societies, 250 supervisors or inspectors are considered necessary. Two hundred and fifty auditors will have to be trained and employed for regular and timely audit of these societies.

III. CO-OPERATIVE FARMING

Ten thousand managers of co-operative farming societies will have to be trained. About 1,000 men will have to be found for supervision and inspection. Half of this number will consist of agricultural graduates. Five hundred auditors will be necessary for conducting the audit of these societies.

IV. STATES DEPARTMENTS STAFF

Three hundred additional gazetted officers will be required to look after the increased work in the Third Plan. Supporting field staff to the extent of 1,000 persons will also be needed.

The total requirements of personnel are as follows:—

(a) Senior Personnel	..	..	1,000
(b) Intermediate personnel	..	..	7,500
(c) Junior Personnel	..	..	30,500
(Table 26-27)	Total	..	39,000

Basic qualification of personnel

10.9. The basic qualification required for the senior personnel is a degree. Most of the existing personnel in this category are Arts, Pure Science and Commerce graduates. There is a good prospect of about 300 to 400 Agricultural Economists with post-graduate degrees being absorbed in the Co-operative sector.

The minimum qualification for the intermediate staff also is a degree. So far, the Co-operative Department as well as the Co-operative Institutions have largely employed Arts, Pure Science or Commerce graduates. A few Agricultural graduates who have chosen to work in the Co-operative Department have given a good account of themselves in jobs where an agricultural background is an asset. We feel that an attempt should be made in the Third Plan to employ agricultural graduates in at least one-third of the posts in this category. On this assumption, the Co-operative sector could absorb a minimum of about 2,500 agricultural graduates in the Third Plan period. To meet this requirement, provision has been made for 2,500 agricultural graduates in the Chapter on "Agriculture". Similarly, in the Chapter on "Agricultural Economics", 300 holders of post-graduate degrees in Agricultural Economics have been provided for.

No special measures for providing basic institutional training to the junior staff are necessary, as the minimum qualifications for recruitment is only Matriculation.

In-service training

10.10. Facilities required for giving in-service training to the personnel are explained below:—

The College at Poona can train 400 senior personnel in five years. Another college for training senior staff may have to be organized. It might also be possible to expand the facilities at Poona. The Central Committee for Co-operative Training may examine this question.

The five regional Training Centres, and the eight Block Level Co-operative Officers' Training Institutes can train 5,000 candidates of the intermediate category at the rate of 1,000 per year. In addition, about 2,500 marketing personnel can be trained at the Regional Centres located at Poona, Madras, Ranchi, Meerut and Indore. Training in Land Mortgage Banking will be given at the Regional Centre, Madras, which is equipped to train about 90 candidates a year.

For the staff required for co-operative farming, special training institutes will have to be established. The National Development Council has recently indicated that three training centres might be established immediately during the current year. It is considered that during the Third Plan period,

facilities available at some of the existing eight Block Level Co-operative Training Centres may be utilized, as, by that time, the requirements for training of Block Level Co-operative Officers will have been fully met.

The existing 45 schools for training the junior staff have a capacity of 6,000 candidates per year, and it should be possible to meet all the requirements without any difficulty.

10.11. The above estimates do not include the requirements of staff for industrial co-operatives, and other non-agricultural co-operative institutions.

CHAPTER XI

AGRICULTURAL STATISTICS

Role of statistics in research in agriculture and Allied subjects

11.1. Agricultural and animal husbandry research is mostly experimental and observational, and the indispensable role in this research of the modern science of statistics based on the laws of mathematical probability (as distinct from the popular meaning of the term statistics connecting tables of figures) for designing experiments and sampling enquiries and for interpretation of their results and other data, is now universally recognized. Application of the principles of experimental and sampling design to the planning of experimental programmes and sampling enquiries enables the questions at issue to be investigated far more effectively and economically. Equally, a proper statistical analysis and summarisation of the results is necessary if correct conclusions are to be reached. It is significant that the growth of the science of statistics owes much to its applications in agricultural research.

Need for more qualified Statisticians in research institutes

11.2. It is coming to be realized in India that a proper appreciation of the applications of statistics to agricultural and animal husbandry research is a valuable asset for research workers in these fields. With this growing appreciation there is greater recognition of the need for qualified statisticians at research institutes and other organizations responsible for the planning and conduct of experimental programmes. In spite of this recognition, however, the rate of appointment of statisticians has been regrettably slow. Apart from the Statistical Wing of the Indian Council of Agricultural Research, it appears that there are still only some 25 fully qualified statisticians occupying officers' posts and working at research institutes and on research problems in state departments of agriculture. If this situation is to be remedied, a far greater number of posts for qualified statisticians will have to be created and provision will have to be made for selecting and training the necessary men to fill them.

Need for statistical teaching in agricultural Colleges

11.3. Since a great deal of agricultural research is quantitative in nature, it is desirable that a good proportion of agricultural research workers should themselves receive some training in the elements of statistics in the course of their scientific training. Indeed, it may be urged that all those taking a degree in agriculture (or indeed in any biological science) should have an opportunity of acquiring some knowledge of statistics, particularly the principles of experimental design and sampling. If this is admitted, provision will have to be made for competent staff for the teaching of statistics at all agricultural colleges, as well as at universities.

Other statistical requirements in agriculture

11.4. In addition to the need for statisticians in agricultural research and teaching, statisticians are also required for the collection and compilation of basic statistical information, such as crop areas and yields, etc. The specialized training required by statisticians engaged in this type of work

is different from that required in the field of research and is not considered in this report.

Assistant staff of Statistical Unit

11.5. Since the statisticians of research institutes are required not only to advise on statistical methods but also to carry out many of the heavier tasks of numerical analysis on behalf of other scientists, statistical assistants and computers form a necessary part of the staff of statistical units. It is indeed important that all statisticians, including those who are primarily engaged in teaching, should undertake a reasonable amount of statistical analysis, for theory without practice and practice means computation—will never make a good statistician, or a good teacher of statistics.

Categories of Statistical Staff

11.6. The staff required by statistical units may, therefore, be divided into three categories :—

(A) Research Statisticians

Research statisticians must be well trained and have research ability. They must be capable of handling competently all the usual types of problem that arise in agricultural research. Such statisticians must also be capable, in conjunction with the other scientists concerned, of making a critical appreciation of the results emerging from their statistical analysis and preparing adequate reports.

(B) Statistical Assistants

Statistical assistants must have a good working knowledge of the more straightforward applications of statistics and methods of analysis. They must be capable of carrying out elaborate computations with a minimum of direction, as well as of supervising and directing the work of computers. They will not be expected to make independent critical appreciations of the results or prepare reports, and will generally work under the guidance of research statisticians.

(C) Computers

Computers must have a working knowledge of the commoner computational methods (which may, however, be acquired in the course of their work) and must have natural ability for computation. They should have a sufficiently critical attitude to their work to be capable of spotting anomalous values and obvious errors.

Staffing of statistical departments of research institutes

11.7. The requirements of statistical staff in a research institute naturally vary with the size of the institute and the type of work. The statistical section must be headed by a research statistician, and to make the best use of this statistician he should have under him at least one statistical assistant together with such computers as are necessary having regard to the work required of him. We are, however, of the opinion that a statistical section of this size is likely to be somewhat unsatisfactory in operation for various reasons. In the first place, there is likely to be a considerable amount of discontinuity. Secondly, a single research statistician is likely to be somewhat isolated, and will often have limited scope for the exercise of his abilities. Thirdly, the advantages that result in all fields of research from contact between relatively junior and more senior and experienced men cannot be realized. In all institutes therefore where there is a reason-

able amount of statistical work (which includes all the institutes and organizations listed in Table 28) a minimum staff of two research statisticians would seem desirable, together with the necessary statistical assistants and computers. In small organizations, where there appears to be no likelihood that a staff of this size will be required, even in the long run, the possibility of utilizing the services of the statistical department of a neighbouring larger institute, or of joining forces with some other small institute, should be explored.

In view of the above considerations we have assessed the average needs for research institutes shown in Table 28 at two research statisticians, two statistical assistants and four computers. In the agro-economic and farm management centres we have allowed for one research statistician, who will be working in co-operation with the economists. The associated junior statistical staff for these centres has already been included in the proposals for staff in the chapter on "Agricultural Economics"

Requirements of State departments of agriculture

11.8. In the states continuity is even more important than in research institutes, since the statisticians play a more important role in the organization of research projects and in the interpretation of the results. We therefore believe that there should be a minimum of two research statisticians in state departments. In all states, however, there are separate departments of agriculture, animal husbandry and forestry, and in five also of fisheries, and in two of sugarcane. In as much as the main need for statistics at the present time is in the Departments of Agriculture and Animal Husbandry we have assessed the initial needs of the states at an average of four research statisticians. The other departments, whenever they feel the need, may get help from these departments. We believe also that the possibility of integrating the statistical work of the various research departments in agricultural fields in a state into one stronger unit should be explored.

Since the amount of relatively simple work will form a larger proportion of the total than at research institutes we have assessed the needs of statistical assistants and computers at 6 and 12 respectively per State.

Statistical staff at agricultural colleges

11.9. Post-graduate agricultural colleges and Universities may be expected to have at their disposal laboratories and experimental farms at which research work will be conducted. Simultaneously, they should also be prepared to undertake training in statistical subjects appertaining to agricultural research. The statistical departments of such colleges and Universities should therefore have a composition similar to the statistical units of research institutes, but the staff will have teaching as well as research duties. In view of this, and the relatively smaller amount of statistical analysis likely to be required, we have assessed the average needs at (a) three senior teaching and research staff (professors, assistant professors and lecturers) who should be equivalent in training and ability to Research Statisticians, (b) three demonstrators, who should be equivalent in training and ability to statistical assistants, and (c) three computers.

Students at undergraduate agricultural colleges will in general only require relatively elementary instruction in statistics. It would, therefore, not be desirable to utilize men who have any real research ability. The

main staffing requirements may in fact be well met by recruitment of category (b) men with previous practical experience, both statistical assistants at research institutes and demonstrators at post-graduate agricultural colleges, with, if thought necessary an intensive six months training course before they take up their duties. Some of the junior lecturers in post-graduate colleges might also be recruited in this way or by promotion from the under-graduate colleges. Alternatively, in some of the under-graduate colleges lectures on statistics may be given by a lecturer, whose primary qualifications are in some other subject, after some special training.

Estimate of requirements during Second and Third Five Year Plans

11.10. On the assumption that statistical units of the structure given above will be set up in the various institutes, etc., during the Second and Third Five Year Plans we may estimate the actual requirements of trained personnel at the end of this period. The details of these estimates are given in Table 28. The total requirements may be put down as follows:—

Research statisticians and senior teaching staff	..	300
Statistical assistants, demonstrators, and lecturers at under-graduate colleges	.. .. .	340
Computers	.. .. .	560

Type of training required

11.11. Research statisticians and senior teaching staff will require to have a good grounding in general statistical theory and in addition specialized training in those branches of statistics which are most important in agricultural research. These branches are:—

- (a) The design and analysis of experiments,
- (b) The planning of experimental programmes and the summarization and interpretation of the results,
- (c) The analysis and interpretation of laboratory data, including bio-assay and general biometric methods.
- (d) Statistical techniques appropriate to genetics and plant and animal breeding.
- (e) The design and analysis of specialized surveys on agricultural practice.

They must also acquire a knowledge of the agricultural sciences. As most statisticians do not receive any biological or agricultural training in the course of their general training, provision should be made for such training in the course of their specialized statistical training.

It is also desirable that some at least of the better students should have an opportunity for some project work on completion of their formal training. Possibilities for this, however, are bound to be limited when the number of those requiring training is large relative to the staff available, and at such times the majority must expect to gain such experience in the course of their work and to learn from those working over them.

Statistical assistants should have some general statistical training, and in addition are likely to benefit from a short intensive course on the methods of numerical analysis that are commonly used in agricultural research, though they should, if necessary, be capable of acquiring such knowledge in the course of their work.

Computers can undoubtedly learn their work under direction from research statisticians and statistical assistants, but in this case also there may be considerable gain in efficiency with short intensive training courses.

Training facilities available at present

11.12. The only place in India at present giving specialized training in agricultural research statistics of the type set out above is the Statistical Wing of the Indian Council of Agricultural Research. The Wing now runs the following regular courses:—

- (1) Diploma Course in Agricultural Statistics of two years' duration designed for training students, who have already taken their M.A. or M.Sc. degree with statistics or mathematics with statistics, as professional agricultural statisticians.
- (2) Junior and Senior Certificate Courses in Agricultural Statistics of five months' and one year's duration, respectively, designed mainly for imparting a working knowledge and understanding of modern statistical methods to research workers in agriculture and animal husbandry.

There is provision for admission of up to 10 students each year to the Diploma Course, 10 to the Junior Certificate Course and 15 to the Senior. The second year of the Diploma Course is mainly spent on project work, with some advanced training in special subjects.

The possibilities of integrating the Indian Council of Agricultural Research training programme with that of the Indian Statistical Institute are at present being explored. If this comes about, students after selection would spend a year at the Indian Statistical Institute, taking the first (general) part of the revised post-graduate course of the Institute and would then spend a further year at the Indian Council of Agricultural Research. As the students will then have a better general grounding than is the case at present, it is to be expected that the Indian Council of Agricultural Research Diploma training can be taken to a more advanced level. Students should also have more time available for training in the Agricultural sciences. The staff of the Indian Agricultural Research Institute already co-operates in such training, and it is hoped that in the future a link-up with the Indian Agricultural Research Institute post-graduate training schemes may be possible.

Students successfully completing this new course will be granted a Diploma and students passing their final examination with special credit and subsequently completing a satisfactory piece of project work either under the Indian Council of Agricultural Research or elsewhere may be granted a Distinction to their Diploma.

Possibilities of expansion of the I.C.A.R., Statistical Wing training facilities

11.13. If the part of the Diploma Course conducted by the Indian Council of Agricultural Research is cut to one year, as will be the case if the students have a preliminary year of general training at the Indian Statistical Institute, it is considered that the annual intake of students may be safely increased to a maximum of 30, provided that only a small number of the best of these, say up to 10, continue for a further year for project work.

With this increase in Diploma training, it is considered that it will be desirable to reduce the amount of in-service training at present given in the Junior and Senior Certificate Courses by the elimination of the Senior Certificate Course. Statistical assistants can also benefit from the Junior Certificate Course and we suggest that the intake of this course may be increased to 20.

To handle this increased Diploma training, a small increase in staff and some additional hostel accommodation will be required.

Relation of Output of Trainees to Requirements

11.14. If 30 students per year are admitted to the Indian Council of Agricultural Research Diploma Course, a total of some 300 students should be trained in the course of ten years. In assessing those likely to become available for employment as Research Statisticians, however, allowance must be made for the inevitable wastage that occurs between the admission of students and those that actually take up posts in agricultural research and teaching. In the first place, a certain percentage of students will fail to complete their course or fail in the examination. These will probably be of the order of 10 per cent. In addition, a certain percentage of those completing their course will obtain jobs outside the agricultural field. The number of these is impossible to assess and depends greatly on other demands for statisticians and on the relative attractiveness of posts in agricultural research and of those elsewhere. A certain loss from this course, however, is likely to be beneficial rather than harmful as it results in a cross-fertilization of ideas; many of the techniques that will be acquired in the course of I.C.A.R. training are directly of value in parallel fields of research, such as the medical and biological sciences.

Taking all these factors into consideration it is clear that the proposed expanded output of trainees by the I.C.A.R. will not fully meet the needs for Research Statisticians if the full expansion of agricultural research set out in the present report takes place by the end of the Third Five Year Plan. We do not, however, think that any immediate increase in the rate of statistical training beyond what we have proposed above is essential. One reason is that in the case of research statistics in particular, relationships have to be build up with the other scientists; the scientists have to learn how to make use of the Statisticians and the Statisticians have to learn how best they can help in the research work. This is a matter that cannot be wholly dealt with by the training.

Moreover, we consider it of the utmost importance if the I.C.A.R. Statistical Wing is to continue to perform its research functions properly, that it should not be committed to too large a training programme. It may be expected, however, that the amount of research work which will be demanded of the I.C.A.R. Statistical Wing will increase considerably with the development of agricultural research and planning needs. This will itself result in an increase of research staff, and therefore make possible a further expansion of training activities (which are shared between the research staff) without disruption of research, should circumstances make such a course necessary.

In the long run also it would appear very desirable in a country of the size of India that other centres of agricultural research statistics should be built up, and it may be hoped that a few of these, particularly those in post-graduate agricultural colleges, will develop as training centres.

Phasing, Creation of Posts and Opportunities for Promotion

11.15. It is an essential pre-requisite of the expanded training programme that arrangements are made for the creation of the necessary posts so that the trainees can be absorbed in the research and teaching structure. It is equally important, if a cadre of high standard is to be built up and maintained, that the initial scales of pay are comparable with those that can be obtained in other fields of activity requiring similar ability and training, and that there are ample opportunities for promotion for those that merit it. Any failure in these matters will result both in the loss of the most enterprising of those entering the service and in lowered quality of those who, deciding to make agricultural research statistics their career, apply for admission to the training courses.

In addition, in order to attract the most promising students for specialised training, experience at the I.C.A.R. and elsewhere has shown that it is essential to provide scholarships for those entering post-graduate courses. Otherwise with the large expansion of non-agricultural statistical posts open to persons with mathematical or statistical university education, many suitable candidates will be attracted to them, although desirous of further specialised training.

CHAPTER XII

AGRICULTURAL ECONOMICS

Introduction

12.1. In the earlier chapters, we have discussed in detail the requirements of technical personnel for research, education and extension. Improvements in technique alone will not be sufficient to solve the multifarious problems of agriculture. Even the most improved production technique, for instance, may not necessarily be so in relation to the limited capital resources of the farmer. The soundness of technical advice will depend on its contribution to the economy of the individual farm and the overall economic development of the country. A close collaboration of agricultural economists with other specialists is, therefore, required to improve the long term efficiency of all sectors of agriculture.

12.2. The importance of research and advisory work in agricultural economics has, of late, been increasingly recognized in almost all the advanced countries. In the U.S.A. research and teaching in agricultural economics have grown rapidly in scope and importance; today, the Agricultural Economics Departments are usually among the very largest in most American colleges of agriculture. A typical small agricultural college has 20 to 30 agricultural economists and rural sociologists working in the research, teaching and extension programmes. The bigger institutions have still bigger departments. In the Netherlands, the depression of the thirties brought agricultural economic problems confronting farmers to the fore. Both, the Government and agricultural organizations felt the need for reliable data on production costs. This led to the foundation of the Agricultural Economics Research Institute by the Dutch Government in 1940, where nearly 200 persons are now engaged in economic research of whom 25 have had University training. In the U.K., about 10 Universities are supported by the Government in their investigations of problems of agricultural economics, and in each university a well-paid staff of 10 to 12 is working on given problems.

Importance of agricultural economic research

12.3. In a country like India, the economy of which is largely agricultural oriented, the importance of research in agricultural economics needs no emphasis. A provision of Rs. 50 lakhs has been made in the Second Plan for agricultural economics and farm management, as compared to Rs. 13 lakhs of the First Plan. Judging from the progress of the work in the country, it can be safely assumed that programmes for expansion of agro-economic research, with particular emphasis on farm management, will occupy an important place in the Third and the subsequent Plans. Such programmes should be built on a sound basis of teaching and research in agricultural economics in the Agricultural Colleges, and should have a bearing on farm management at the level of the individual farmer. These programmes would necessarily require trained personnel on a much larger scale than are available at present. Apart from the requirements of research, officially sponsored as well as that undertaken by non-official institutions such as the universities, etc., personnel trained in agricultural economics are also likely to be required in other sectors of agricultural development, *e.g.*, co-operation and marketing.

Difference in methods of approach

12.4. Although the role of agricultural economics will be the same in all countries, the approach in each country will be governed largely by the general level of education of its farming community, the size of its holdings, its system of cultivation, etc. This in turn will influence the organizational set up. In advanced countries with a higher standard of education among the farming community and with fairly big sized holdings under mechanized cultivation, it is feasible to collect data through the questionnaire method. In India, on the other hand, it is necessary to approach the individual farmer. This difference in the method of collecting data will require a different organizational set up in India, with a relatively large number of junior staff for field work.

Personnel requirements

12.5. The requirements of personnel trained in agricultural economics are assessed in the following paragraphs. The assessment covers only such personnel as should have a basic degree.

1. Requirements of agricultural colleges for teaching of and research in agricultural economics

Agricultural colleges are at present paying inadequate attention to teaching of and research in agricultural economics. Professorial Chairs in agricultural economics, headed by officers of Class I status, exist only at the two agricultural colleges at Poona and Kanpur, where in addition to teaching of agricultural economics, some research work is also being undertaken. Agricultural economics is also being taught in a few other agricultural colleges with Class II Officers in charge of the departments, some of which are not adequately equipped for undertaking research work. The subject is, further being taught at the post-graduate level in some Universities and institutions such as the Bombay School of Economics and Sociology. The candidates admitted to this course have a basic degree in economics and not agriculture. Because of the factors mentioned above, personnel now available, are mostly either economists with inadequate agricultural training or agriculturists with only limited training in economics. Broadly speaking, for types of jobs involving field work, a person qualified at the post-graduate level in agricultural economics after graduating in agriculture would be more useful. On the other hand, for analytical work at headquarters, a post-graduate degree in economics with specialisation in problems of agriculture appears to be more desirable. We feel that it would be necessary to provide for both types of training.

Teaching agricultural economics in agricultural colleges involves among other things, three major responsibilities. The first of these is to help students through teaching to acquire a working knowledge of farm management and ability to interpret the economic developments so that they may use this knowledge in improving their effectiveness in their own business and in working with others. The second is to carry on research, which provides information designed to enable farmers to use their resources to achieve more efficient production, and better marketing of their produce. The third is to interpret material which will help farmers to anticipate changes in demand and costs. Consequently, for effective teaching, there should be a strong department of agricultural economics covering the fields of farm management, marketing of farm products, farm accounting and farm cost studies, agricultural credit problems, shifts in consumer desires,

and agricultural outlook. It follows that such departments should have officers of the Class I status incharge, with adequate support at lower levels. To begin with, we recommend a minimum staff of one Professor (with doctorate in agricultural economics), one Assistant Professor (with post-graduate degree in agricultural economics), two Lecturers and Demonstrators (with post-graduate degrees in agricultural economics) and four Field and Laboratory Assistants (graduates in agriculture with economics) for each department.

In the chapter on 'Agriculture' we have emphasized the need for developing at least one agricultural college in each state for initiating post-graduate research and education in the different scientific disciplines. Agricultural economics should be one of those disciplines, and the Professor in-charge of the department of agricultural economics, as suggested by us, could also be the agricultural economist to the state government and, have necessary research support. This would enable the department also to take up research schemes sponsored by the I.C.A.R. and other agencies. The agricultural economics sections in Poona and Kanpur colleges should also be expanded to enable them to take up a more intensified programme of research.

Adequate facilities for teaching and research in agricultural economics do not at present exist at the Indian Agricultural Research Institute, New Delhi; but it is proposed to provide such facilities under the Second Plan. Some staff expansion will be required during the Third Plan period.

It is also necessary that all the major Commodity Committees should have their own agricultural economics sections. At present, only the Indian Central Jute Committee has an economics research section headed by a Director. The Cotton, Sugarcane and Oilseeds Committees should set up such sections during the Third Plan period.

The requirements for setting up 12 new departments in agricultural colleges and three new units for the Cotton, Sugarcane and Oilseeds Committees, and for expanding the four units in the agricultural colleges in Poona and Kanpur, the Indian Agricultural Research Institute, New Delhi and the Jute Committee will be:—

Doctorate in agricultural economics	..	..	15
Post-graduate degrees in agricultural economics	..	..	60
Graduates in agriculture	..	..	90

2. Requirements of Agro-Economic Research Centres

Four Agro-Economic Research Centres were established by the Ministry of Food and Agriculture during the First Plan period mainly to conduct continuous village surveys to assess changes in the village economy, and to undertake research on *ad hoc* problems of particular interest to the Central and the State governments; and on the basis of their findings and conclusions to advise the governments on technical problems relating to agricultural economics. In addition to the expansion of four centres already set up under the First Plan, one additional centre is proposed to be set up with effect from 1958-59, and another from 1959-60. It may be necessary to set up two more centres under the Third Plan so as to cover adequately all the broad regions within the country.

The minimum qualification required for most of the posts is a post-graduate degree in agricultural economics, or a degree in agriculture, or a post-graduate degree in economics or statistics. About a third of the total personnel would need to have qualifications in agriculture or agricultural economics. On this basis, the additional requirements during the Third Plan period will be about 23, as indicated below:—

Doctorate in agricultural economics ..	2
Post-graduate in agricultural economics ..	6
Graduate in agriculture with economics ..	15
	—
Total ..	23
	—

3. Farm Management Investigations

Under the First Plan, farm management investigations were undertaken at six selected centres. The first series of investigations having been satisfactorily completed, the studies are proposed to be extended to six more centres under the Second Plan of which three have already been initiated during 1957-58. The Ministry of Food and Agriculture has secured the services of a few foreign experts and with the help of these experts and the farm management investigations currently in hand, it would be possible to evolve appropriate techniques for farm management investigations and for the application of farm planning and budgeting methods by the end of the Second Plan.

Under the Third Plan, it is proposed to establish 40 new Farm Management Units to cover the whole country, grouped into 14 Regional Centres, one in each State. The main function of these centres, will be to collect, analyse and interpret the data required for working out plans for the optimal allocation of farm resources to maximise returns from farming. The input and output relationship, prices, wages and costs on the basis of which the most desirable use of farm resources is to be worked out are all subject to change under the influence of uncontrollable factors such as weather, pests and diseases, and economic forces. These also vary from region to region. It is, therefore, proposed that these 40 centres will be mainly devoted to making an intensive study of the special problems of each area and concentrate their attention primarily to research. Results of the research carried out by these centres will be disseminated to cultivators through the National Extension service. It is estimated that the programme would require about 120 graduates. Of these, persons requiring training in agricultural economics and in agriculture would be as under:—

Post graduate degree in agricultural economics ..	14
Graduate degree in agriculture (with economics as a special subject)	85

4. Ad hoc Research Schemes in agricultural economics

It is very difficult to give an idea of the total number of research schemes involving studies in agricultural economics and rural sociology likely to be financed by the various organizations during the Third Plan period. However, we have assumed that the I.C.A.R. will be sanctioning at least 10 new schemes every year. Adding to these the schemes likely to be sanctioned by the Research Programme Committee of the Planning Commission, the

Ministry of Food and Agriculture and other organizations, a total of 100 new schemes may be undertaken during the Third Plan period. These schemes will cover land economics, agricultural prices, agricultural marketing, agricultural policy, methodological research in agricultural economics, and Extension.

Assuming that on an average one Class II Officer and four Analysts will be employed in each scheme, the total number of persons required for the research schemes would be as under:—

	Total number of persons.
Class I/II Officers with post-graduate degree ..	100
Analysts with a degree in agriculture economics or in economics	400

60 per cent in each group may have to be persons with qualification in agricultural economics or agriculture. In addition, there will be staff for field work, statistical compilation, etc., which are not considered here. They will not require a degree in agriculture or agricultural economics.

5. Requirements of Co-operative Development Schemes

In the Chapter on 'Co-operation' we have estimated that of the 1,000 senior personnel required, about 400 should have had basic training in agriculture with agricultural economics. Of these two-third may have intensive training in agricultural economics at the post-graduate level with special emphasis on marketing and co-operation.

6. Requirements of Agricultural Marketing Schemes

In the Chapter on 'Agricultural Marketing' we have estimated that about 330 graduate personnel in agriculture with specialisation in agricultural economics would be required, of whom 100 would have post-graduate degrees in agricultural economics.

7. Requirements of Farm Management Extension Service

In view of the increasing role that farm management Extension is bound to play in the programmes of Community Development, Extension specialists in farm management should be provided at appropriate levels. In the Chapter on 'Agriculture', we have suggested the provision of five Extension officers at the Block level and five Extension specialists at the district levels. We have also assumed that during the Third Plan period, about half the number of districts and about 500 Blocks may be covered by the Farm Management Extension service. The requirements will thus be 160 persons with post-graduate degrees in agricultural economics, and 500 graduates in agriculture with economics.

8. Other requirements

In addition to the types of needs enumerated above, non-official agencies such as the Reserve Bank of India (Research and Agricultural Credit departments), Farmers' Organizations (*e.g.*, Farmers' Forum) and the Universities would also require the services of agricultural economists. It is difficult to estimate the exact requirements of these agencies, but tentatively their requirements may be taken at about 100 persons of whom about one-third should possess post-graduate degree in agricultural economics, while the remaining two-third should have degrees in agriculture.

The total requirements of personnel for the various schemes outlined in the proceeding paragraphs would be as under:—

	Doctorate	Post-graduate Degrees in agricultural economics	Graduate in Agriculture
(1) Post-graduate agricultural colleges	15	60	90
(2) Agro-Economics Research centres	2	6	15
(3) Farm Management Research centre	—	14	85
(4) Agro-Economic Research Schemes			
<i>Ad hoc</i>	—	60	240
(5) Co-operative Development Schemes	—	270	130
(6) Agricultural Marketing Schemes	—	100	230
(7) Farm Management Extension	—	160	500
(8) Other requirements	3	30	60
Total	20	700	1,350

12.6. The total requirements of persons with Doctorates in agricultural economics is 20, and of those with post-graduate degrees in agricultural economics, 700, over a period of five years. The requirements of persons with training in agricultural economics at the graduate level will be about 1,350. Since it is envisaged that persons with post-graduate degree in agricultural economics, for whom provision has been made above, should also have basic agricultural training at the graduate level, the total provision for instruction at the graduate level should be about 2,000 over the five year period. We have included this requirement in the chapter on 'Agriculture'.

Training programme

12.7. The Indian Council of Agricultural Research is at present awarding two senior and two junior fellowships for advanced training in agricultural economics, the senior fellowship for undertaking work leading to the Doctorate. The Indian Agricultural Research Institute will also be providing facilities for persons working for Doctorates in agricultural economics, when the post-graduate school is set up. In addition, one or two officers may be sent abroad every year for advanced training in agricultural economics and farm management, under foreign aid programmes. It will, thus, be possible to meet the requirements of senior personnel required for the various schemes outlined above.

We understand that the Agricultural Economics Committee of the I.C.A.R. is at present engaged in drawing up a suitable syllabus for the course in agricultural economics at the graduate and post-graduate levels in the agricultural colleges. We suggest that the Committee may also go into the question of teaching of agricultural economics in the Universities and make recommendations on the subject.

We have not collected information about the annual outturn by the Universities of persons who secure post-graduate degrees and Doctorates

in economics, with specialisation in agricultural economics. Even for teaching agricultural economics at the agricultural colleges, a number of such persons would be needed. We suggest that the University Grants Commission may take up this matter with particular reference to the question of expanding and improving facilities for teaching of and research in agricultural economics at the Universities.

CHAPTER XIII

AGRICULTURAL ENGINEERING

Introduction

13.1. Agricultural engineering covers subjects like farm power, implements and machinery, farm buildings and structures, principles and practices of farm irrigation and soil and water conservation and erosion control, including land drainage, reclamation, etc. An agricultural engineer is trained in both engineering and agriculture, with experience in combining the two, and is qualified to develop, design, organise and direct engineering work in agriculture and closely allied activities. Agricultural engineering has made rapid strides in many countries and has now come to be regarded as a basic branch of engineering.

Present Position

13.2. Although some work on farm implements has been done by the State agricultural departments, the subject of agricultural engineering has, by and large, not received adequate attention in India. While agricultural engineering cannot play the same role in India as in countries where there is shortage of manpower and production per man-hour is required to be increased, the present position is not very satisfactory. Agricultural colleges in India have some facilities for teaching the principles of agricultural engineering, but they do not prepare students for a degree in agricultural engineering. The Institute of Technology, Kharagpur and the Agricultural Institute, Allahabad, are the only two institutions imparting training in agricultural engineering up to degree standard.

For the first time, a survey of indigenous agricultural implements in use throughout the country was undertaken recently. The intention was to undertake research work based on the results of the survey. Four regional research stations are being set up during the current Plan for designing and research in bullock drawn implements. Improved implements, both indigenous and foreign, are being tried by the States. Some State Governments have set up advisory committees consisting of representatives of the agricultural departments, manufacturing firms and farmers for testing and popularizing improved agricultural implements.

The scope for employment of agricultural engineering graduates is limited at present. This is evident from the following analysis of the information furnished by the States and institutions regarding posts for which a degree in agricultural engineering is the exclusive or is one of the permissible qualifications :—

Sanctioned No. of posts (June, 1957)	No. of posts filled up	Vacant posts	Posts likely to be sanctioned (1957—61)	Total Requirements (1957—61)
260	215	45	35	80

(This includes the requirements of soil conservation and land reclamation. The Engineering Personnel Committee assessed the requirements of agricultural engineering graduates during the Second Plan period at 60). It is not known as to how many of these posts have been filled by graduates in agricultural engineering and how many by graduates in other branches of

engineering. It is, however, estimated that not more than 160 graduates in agricultural engineering have been turned out by the Agricultural Institute, Allahabad, and the Institute of Technology, Kharagpur. The output from these two institutions, about 30 a year, would be adequate to meet the needs during the remaining years of the Plan.

Requirements of Third Plan

13.3. It is expected that work on agricultural implements will be intensified during the Third Plan period. Some of the improved implements are gaining in popularity, but their use has not yet reached the desired level. The following table shows that gradual increase in the use of improved implements and the scope for further expansion:—

Agricultural Implements in use in India

(Figures in Thousands)

Implements 1	1945 2	1951 3	1956* 4
Ploughs	27,800	32,700	38,300
Carts	8,500	9,900	10,700
Sugarcane Crushers	490	541	569
Oil Engines	12	95	113
Electric Pumps	9	30	55
Tractors	5	8	18

With the increasing number of land development measures that are being undertaken, application of engineering principles in solving the many problems that arise in land management, land drainage, erosion control, irrigation practices and the use of improved agricultural implements, is obvious. For a proper development of this important branch of science as an aid to agricultural production, adequate arrangements would be necessary to intensify research, application and teaching in agricultural engineering. In the chapter on 'Agriculture', we have emphasized the need to develop at least one college in each State as a centre for post-graduate research and teaching in the different disciplines of agriculture, including agricultural engineering. The requirements of additional personnel in this respect are estimated as under:

Professors/Associate Professors (class I)	..	..	10
Assistant Professors (class II)	..	..	20
†Lecturers/Demonstrators/Research Assistants	..	..	60

The agricultural engineering sections in the States and at the Central Institutes are not, at present, adequately staffed; and will require strengthening. Two more regional research stations for designing and research in agricultural implements are proposed to be set up. Fifty *ad-hoc* schemes may

† Figures for 1956 are provisional estimates; tractors mean, tractors used for agricultural purposes.

† It is assumed that four agricultural colleges would be developed for post-graduate research and teaching during the Second Plan. The requirements are, therefore, in respect of ten colleges only.

be taken up under the Third Plan. The total requirements may be estimated as under :—

	Scientific officers class I/II	Research Assistants
Agricultural engineering sections in the States	20	40
Additional regional research stations ..	10	20
<i>Ad hoc</i> research schemes ..	50	100
	—	—
Total ..	80	160

The Class I and Class II officers should have post-graduate training in agricultural engineering. The Research Assistants should be graduates in agricultural engineering.

In the chapter on 'Agriculture', we have assessed the requirements of specialists/Extension officers in agricultural engineering, at the district/Block level at 660, of whom 160 should have post-graduate training. Similarly, in the chapter on 'Soil Conservation', we have assessed the requirements of graduates in agricultural engineering at 30.

In addition to the above, firms manufacturing agricultural implements and those dealing in tractors will require trained personnel. Their requirements may be put at 50.

Personnel required for tubewell construction in new areas could be found by utilizing those who will be released from the intensive drilling operations being undertaken in the Punjab, Uttar Pradesh, and Bihar. This is on the expectation that the exploration programme of the Exploratory Tubewells Organization would be concluded by March, 1959, and that tubewell construction in new areas will have been started even during the current Plan.

The total requirements will thus be:—

	Post-Graduates graduates	Total number of graduates
1. Post-graduates research and training in agricultural colleges ..	30	60
2. Requirements of research ..	80	160
3. Agricultural extension ..	160	500
4. Soil conservation ..	—	30
5. Requirements of industry ..	—	50
	—	—
Total ..	270	800
		1,070

Requirements of irrigation engineering and land drainage have not been taken into account as it is presumed that these will be covered by the Ministry of Irrigation and Power.

This will involve an annual output of about 200 graduates in agricultural engineering, including the present output.

Measures to meet the requirements

13.4. We understand that the Engineering Board set up by the Ministry of Education and Scientific Research has also examined this question and has assessed the requirements at 200 graduates per year in agricultural engineering for the next five years or more. That Board suggested that the courses in agricultural engineering should be started on a regional basis in engineering colleges at selected centres having an agricultural college close by. We endorse this suggestion.

Employment opportunities

13.5. Limited employment opportunities in the field of agricultural engineering have been retarding the growth of this important branch of applied science as an aid to agricultural production. With the rapid industrialization of the country, engineering graduates have much better opportunities, and unless the agricultural engineer feels that the avenues of employment open to him also are sufficiently attractive agricultural engineering will have a stunted growth. It follows that, as far as possible, deliberate attempts should be made to increase the employment opportunities for agricultural engineers.

CHAPTER XIV

PLANT PROTECTION

Importance of plant protection

14.1. A considerable reduction in the yield of crops occurs because of pests and diseases and if measures to control them are undertaken on an organised basis, they may contribute upto 10 per cent additional production. Moreover, elimination of this risk, encourages the farmer to strive for attaining a higher level of production.

Basic objective

14.2. At least a half of the total gross area of about 350 million acres under cultivation in India, requires in a normal year intensive or continuous measures of plant protection. While the bulk of such measures would be undertaken by the farmers themselves on an annually expanding scale, Governmental measures should be directed largely towards providing technical advice and material assistance in the shape of insecticides, pesticides, etc., through plant protection and other extension personnel. The impact of such advice and assistance from Government personnel may be directly felt over about 30 to 40 million acres by the end of the Third Plan as against 10 to 15 million acres at present; and the indirect and consequential benefit may extend over a much larger area. Since the main burden of giving technical advice and assistance must fall on the personnel recruited and maintained exclusively for plant protection purposes, the estimate of plant protection personnel for the Third Plan has to be based on the intensification and extension of the work of pest and disease control all over the country in the light of growing requirements, greater availability of facilities, improvements in techniques, higher levels of farmers education and new problems of pests and diseases, which are bound to arise.

Second Plan requirements

14.3. The expansion of plant protection activities in the States in the Second Plan period has been more in the direction of providing greater resources for pesticides and equipment than towards increasing the staff. By the end of the Second Plan, there would, it is expected, be approximately 25 scientific officers (including both class I and class II officers) and 260 graduate technical assistants recruited exclusively for plant protection work, in the States and the Union Territories. Similarly in the Central Directorate of Plant Protection, there would be about 40 scientific officers and 40 graduate technical assistants. At present, the location of the technical personnel for plant protection work in nearly all the States stops at the district level. The other Extension staff below the district level have generally not been in a position to render adequate and effective assistance for pest and disease control; and as a result, vast areas have usually not been covered.

Third Plan objectives

14.4 Extension of plant protection activities would, therefore, require the support of qualified field personnel which should be competent to

diagnose diseases and which would either render assistance immediately or call on the plant protection agency for relief. The most effective way of doing this is to provide each Block with a qualified Plant Protection Extension Officer of the graduate type supported by a specialist (with a post-graduate degree) at the district level (see chapter III, para 3.16). Their main functions would be to assist farmers, either directly or through other Extension personnel, in adopting measures of pest and disease control, to provide training and refresher courses to village level workers, farmers and others, to initiate and organise control campaigns when epidemics break out, to demonstrate the use and value of new pesticides and machines, to collect useful information about damage to crop and results of control campaigns and to provide material for publicity and propaganda. For all these functions, the multi-purpose worker at the village level would not be adequate, although he would have his own uses in disseminating information about plant protection measures, in transmitting reports about the appearance of pests and diseases, and in other similar matters.

At the State level, the plant protection organisation should more and more serve as an agency for technical guidance, training and assistance. The main requirement for the State level organisations would be the provision of whole-time senior Plant Protection Officers (Class I); at present such an officer exists only in one State. Some States have felt the need for increasing the number of junior officers (Class II) and some personnel in lower technical categories. With the extensive development of plant protection activity the work of the Central organisation will also increase, and additions to its personnel would be necessary. These requirements are estimated at 50 scientific officers and 240 graduate technical assistants.

Except for a marginal expansion in the organisations at the Centre and at the State level, the pattern of field staff for Extension suggested should be adequate to meet future needs, although adjustments within the broad pattern, depending upon the degree of infestation in particular areas would be necessary. The rate of coverage of areas for plant protection in future would not necessarily be directly related to the pace of the expansion of staff. After some time, the effect of plant protection measures in different areas would make the cultivator appreciate more and more the value of those measures; and as a result, not only would he adopt the measures himself, but he would also provide an example to others to do so. The pace of development would, however, be considerably accelerated if the village level worker were an agricultural graduate, responsible for agricultural Extension exclusively. In that case the plant protection needs of a larger area would be brought to the notice of the plant protection organisations than would be the case if the plant protection staff have to operate almost entirely on their own.

Since it cannot be foreseen whether and when there might be a serious locust plague during any period of the Third Plan, we do not consider it necessary to add to the personnel requirements on the basis of any anticipated locust plague. In any case, the more widespread the plant protection service and large the plant protection staff the less would be the specific requirements for locust control.

Requirements of agricultural graduates

14.5. The total requirements of graduate technical personnel for plant protection work during the Third Plan period will, thus, be 5,800 as stated below :—

For Central and State Organisations

Scientific Officers	.. .. .	50
Assistants	.. .. .	240

For Extension work

Extension specialists at district level	.. .. .	320
Extension officers at Block level	.. .. .	5,200
Total	.. .. .	5,810

(Table 29)

or 5,800 (round)

The Scientific officers and Extension specialists at district level should have post-graduate degrees in agriculture or in pure science, and the Assistants and Extension officers, graduates in agriculture or in pure science. Assuming that half the number of posts could be filled by graduates in pure science, the number of agricultural graduates required will be 2,900. In the chapter on 'Agriculture' we have provided for 2,760 agricultural graduates for Extension work in plant protection. The small number of about 140 agricultural graduates required for the plant protection organisations in the States and at the Centre can be met from the total number of agricultural graduates proposed by us.

Training facilities

14.6. Training facilities in different types of plant protection work are not well developed in many States of India. The most effective way of developing such training facilities for the plant protection personnel of the State Governments, as distinct from village level workers, farmers, etc., would be through the plant protection stations set up by the Centre on a regional basis. The Central programme would be intended largely for the benefit of the State plant protection personnel of the level of graduates in pure science or agriculture, the lower category of staff being left to be trained in turn by such qualified personnel. The existing regional stations of the Central Plant Protection Organisation would be adequate for giving this training.

CHAPTER XV

SUMMARY OF OBSERVATIONS, CONCLUSIONS AND PRINCIPAL RECOMMENDATIONS

CHAPTER II—SCOPE OF ENQUIRY AND APPROACH

1. Our survey covers all categories of trained personnel required for the execution of what may be called the governmental and semi-governmental programmes of development, extension, research and education in the entire agricultural sector. The requirements of the private sector have not been included except in a few subjects like marketing, agricultural engineering, and agricultural economics. (paras 2.1 & 2.2).

2. Assessment of requirements has been made for superior key personnel, senior posts for which post-graduate training in some branch of science or in agriculture would ordinarily be necessary, junior posts for which graduates in agriculture, veterinary science or allied subjects would be required and subordinate posts for which the basic qualifications would be lower than a degree, but for which specialised training in agriculture or an allied branch of science would be necessary. (para 2.1).

3. We realise that our gigantic agricultural labour force, enterprising farmers and rural leaders would also require some sort of training for bringing about an abiding improvement in agriculture. Considering the size of the problem, we have, under present conditions, to depend largely on the extension organization to perform this task. (para 2.2).

4. Although our recommendations cover *ad hoc*, in-service and refresher training, we have concentrated our attention mainly on the question of development of facilities for regular institutional training which takes not less than 3 to 4 years and has, therefore, to be planned well in advance if future development is not to be hampered or held up for want of trained personnel. (para 2.3).

5. The economic development of the country and the raising of the standard of living of the common man will continue to depend to a very large extent on our success in developing agricultural production. The Second Plan has a target of stepping up production of foodgrains at the average rate of roughly 4½ per cent per year and of all agricultural commodities by about 5½ per cent per year. In making our assessment of requirement of trained agricultural personnel for the Third Plan, we have therefore, proceeded on the assumption that the rate of growth in agricultural production planned for the Second Plan has not merely to be maintained but somewhat stepped up and we have felt justified in assuming a target of increase in agricultural production at the rate of about 5 per cent per year during the Third Plan period. (para 2.4).

6. The development of horticulture, animal husbandry, dairying and fisheries initiated under the Second Plan needs to be expanded still further in the Third Plan period to provide a more balanced diet to the people. Increasing attention has to be given to proper land management, including crop rotations, that will provide sufficient diversity to include production of leguminous fodder and forage crops in the cropping scheme which will not only increase soil fertility but also help in the production of adequate cattle feed for a vigorous livestock improvement programme. (para 2.4)

7. Agricultural credit will have to be provided on a much larger scale than is envisaged in the Second Plan for achievement of the higher production targets of the Third Plan. (para 2.4).

8. There will similarly be a need for strengthening the organization of agricultural marketing and grading for a proper handling of the increased production of agricultural commodities. (para 2.4).

9. We expect that the study of agricultural economics and farm management, which has so far been neglected in this country, will need special attention during the Third Plan period. (para 2.4).

10. The scope for increasing the agricultural production in the country is great; a great deal of effort and organization will, however, be needed to raise the level of our agricultural production and maintain it at the high level which we find in more advanced countries. (para 2.5).

11. We have reviewed the present set up of research, education and extension in agriculture, animal husbandry and allied fields and reached the conclusion that the trained personnel provided at present is inadequate both in quality and number, and will need to be considerably strengthened at different levels if we are to achieve substantial results. Our study of the development of agriculture in other countries shows that the need for highly trained personnel increases with the increase in the intensity of agriculture and the introduction of scientific methods of cultivation. (para 2.5).

12. In recommending the expansion of training facilities we have kept two considerations constantly before us viz. (1) the need for ensuring man-power preparedness in the Third Plan period and (2) practical difficulties in the way of rapid expansion of training facilities, such as shortages of equipment and teachers. We have also kept in view the disadvantages of too rapid an expansion of permanent training facilities. (para 2.6).

13. The timely implementation of our recommendations will, more or less, ensure man-power preparedness in the agricultural sector during the Third Plan period, and failure to do so may create difficulties. (para 2.6).

CHAPTER III—AGRICULTURE

14. Admissions to agricultural colleges increased from 1,250 in 1953-54 to about 2,660 in 1957-58 as a result of measures initiated towards the end of the First Plan to expand the training facilities. (para 3.2).

15. In June, 1957, there were 30,200 posts in the agricultural sector for which a degree in agriculture or some other branch of science or arts had been laid down as an essential qualification. Of these, there were 10,600 posts for which a degree in agriculture was considered to be an essential qualification, and 4,700 posts for which a degree in agriculture was at preferential qualification. For 4,200 posts, graduates in agriculture were eligible without enjoying any preference. The remaining 10,700 posts had qualifications in subjects other than agriculture. (para 3.4):

16. Out of the 10,600 posts for which a degree in agriculture was an essential qualification, 9,000 had been filled by June, 1957, and 1,600 posts were vacant; out of 4,700 posts for which a degree in agriculture was a preferential qualification, 4,200 had been filled. (para 3.4).

17. It is estimated that during the period June, 1957—March, 1961, there will be need for 8,900 agricultural graduates. This is on the basis that there will be 6,900 posts for which a degree in agriculture is regarded as an essential qualification, and 2,000 posts for which such a degree is a preferential qualification. (para 3.5).

18. The output of all the agricultural colleges during 1957—61 is estimated at 6,100. There will thus be a shortage of about 2,800 agricultural graduates by the end of the Second Plan period. If only posts for which a degree in agriculture is regarded as an essential qualification are taken into consideration, the shortage will be of the order of 800. To this should be added the requirements of multi-purpose high schools which may be about 500. The deficiency cannot be made good during the Second Plan period. If, however, the N. E. S. programme is staggered so that the entire country is covered by 1963 instead of by 1961, the requirements of agricultural graduates during the Second Plan period would be reduced by 1,900. (para 3.6).

19. The continuing annual expansion of agricultural production at the rate of about 5 per cent proposed in the Third Plan period will, in our opinion, necessitate considerable strengthening of the existing set up for agricultural research, education and extension. (para 3.2).

20. For strengthening the research set up, we consider it of prime importance that the measures initiated under the Second Plan for expanding post-graduate research and training should be extended so that at least one agricultural college in each State is developed during the Third Plan period, for initiating post-graduate research and education. (para 3.9).

21. There should be some link between these colleges and the Central Research Institutions, such as the Central Rice Research Institute, Cuttack, so that facilities provided for research at the Central Institutions are available for post-graduate students. (para 3.9).

22. In addition, a large net-work of research stations for dealing with the specific problems of each agro-climatic region and tract having a particular type of soil and climate should be developed. At least 50 such major research stations (including existing units) would need to be developed by the end of the Third Plan period; this would provide one properly equipped and staffed research station for undertaking research work in all the branches of agriculture of importance to each of the major agro-climatic region. Each of these stations would need to be supported on the average by two sub-stations. (para 3.10).

23. During the Third Plan period at least 30 experimental farms should be set up in areas served by new irrigation projects with a view to evolving methods and means of ensuring the fullest and the most economical use of irrigation facilities. (para 3.10).

24. Thirty-four model agronomical farms proposed to be established by the end of the Second Plan should be increased to 50 under the Third Plan to provide a model agronomical farm for each major agro-climatic region. (para 3.10).

25. The scheme of simple fertiliser trials on cultivators' fields which is expected to cover 200 districts by the end of the Second Plan may need to be extended to the remaining 120 districts during the Third Plan period. (para 3.10).

26. To intensify plant protection measures, it will be necessary to strengthen the entomology and mycology sections in the State agricultural departments. (para 3.10).

27. There would be need for special developmental staff for each major food crop on the lines of developmental staff appointed during the Second Plan period for stepping up the production of some commercial crops.. (para 3.10).

28. On the assumption that roughly 50 per cent of the research posts in agricultural chemistry, entomology mycology and botany may be filled by pure science graduates the requirements of agricultural graduates for purposes of agricultural research and development may be placed at 4,500. Of this number 2,000 should have post-graduate qualifications. (paras 3.11 and 3.12).

29. Agriculture must occupy the pride of place in the National Extension Service programme. The effectiveness of this programme must depend to a very large extent on the quality and training of the village-level worker and his competence to win the confidence of the cultivator. The training of the village level worker should extend over a period of at least 2 years and intensive training in agriculture should continue throughout this period. (para 3.13).

30. The jurisdiction of the village level worker should be reduced to 5 villages. (para 3.14).

31. Our objective should be to raise the village level worker to the level of an agricultural graduate over a period of time. (para 3.15).

32. For effective technical guidance to the village level workers the Block level staff should be strengthened by the addition of 4 agricultural graduates with some special training in selected subjects. (para 3.16).

33. There should be 5 agricultural subject-matter specialists at the district level with post-graduate training in their respective fields. (para 3.16).

34. A small 'Extension Wing' consisting of a selected number of subject-matter specialists with training in Extension methods to help to develop an effective farm advisory service will be necessary in each State. (para 3.17).

35. Additional requirements of agricultural graduates during the Third Plan period for Extension work would be of the order of 11,560. (para 3.18).

36. The requirement of agricultural graduates in the entire agricultural sector during the Third Plan period has been estimated at 27,500, resulting in an annual demand for agricultural graduates of 5,500.. (para 3.19).

37. For an annual output of about 5,500 agricultural graduates, it will be necessary to provide facilities for admissions of 6,000 students yearly in the agricultural colleges as against the admissions of 2,600 at present. (paras 3.19 and 3.20).

38. The present high wastage in the colleges of agriculture should be reduced to not more than 10 per cent; any higher wastage must be regarded as a serious matter. (para 3.20).

39. For, meeting the additional training requirements of the Third Plan, the quickest way would perhaps be to expand, wherever possible, the existing institutions to the desired level without lowering the efficiency of training. (para 3.21).

40. On the assumption that the admission potential in the existing institutions would be increased to 4,500 annually, and that the new Agricultural University proposed to be established at Rudrapur (Uttar Pradesh) will take about 200 students per year, there would still be need for the establishment of about 8 new institutions with a total of 1,300 seats. (para 3.21).

41. The new institutions may be set up in States or Zones where the gap between the output and prospective demand is the greatest. (para 3.21).

42. As the training of an agricultural graduate extends over 3 to 4 years and the expansion of training facilities also takes time, it will be necessary to take action for further expansion of training during the Second Plan period. (para 3.21).

43. Meanwhile, proposals already under way for setting up new institutions like the Agricultural University, Rudrapur (Uttar Pradesh), should be implemented with all possible speed. (para 3.21).

44. In selecting the location of new agricultural colleges certain principles enunciated by the Indo-American Team on Agricultural Research and Education with the object of developing research, education and Extension as an integrated programme should be borne in mind. (para 3.21).

45. If it is agreed that the village level workers should eventually be agricultural graduates, it may be assumed that our requirements of agricultural graduates in the entire agricultural sector in course of time would be of the order of 1,50,000. At the rate of 3 to 4 per cent wastage due to retirement the annual replacement will be nearly 5,000 agricultural graduates when 1,50,000 graduates are in position. The additional training facilities recommended by us will thus need to be continued without reduction even beyond the Third Plan period. (para 3.23).

46. Village level workers who have the requisite qualification for entering an University may be encouraged and helped to enter agricultural colleges after acquiring 2 to 3 years' practical experience in the field. (para 3.22).

47. Those who lack the basic qualifications for entry to a University could also, with advantage, be given higher training in suitable centres after they have served for some time to enable them to get an agricultural diploma. The possibility of developing such centres around the existing extension training centres/Rural Institutes should be explored. (para 3.22).

48. It is estimated that nearly 1,200 post-graduate degree holders in agriculture would be required during the period 1957—1961 of the Second Plan, while the output, according to present capacity, may be about 1,000. The present shortage of experienced officers for filling key positions will, however, continue for some time. (para 3.24).

49. The requirements of post-graduate degree holders in agriculture during the Third Plan period will be of the order of 4,500. On the basis of expansion of facilities recommended by us, the colleges will be in a position to turn out 1,000 to 1,200 post-graduate degree holders annually. The full effect of the expansion will, however, be felt only in the later stages of the Third Plan. (para 3.24).

50. It is important that the States should undertake an early review of the available personnel who are basically qualified for appointment as teachers in the post-graduate colleges, and arrange for their higher training where necessary. (para 3.24).

51. 24,000 village level workers were trained upto November, 1957. Leaving a balance of about 27,000 to be trained during the rest of the Second Plan period. These could be trained by October to November, 1960 if the capacity of the training centres is fully utilised. (para 3.25).

52. If the setting up of National Extension Service Blocks is staggered beyond 1961, the requirements of fresh village level workers will be spread over a longer period. In that case, the Extension Training Centres could usefully utilise their surplus capacity to give refresher courses to village level workers. (para 3.25).

53. If our recommendations regarding the training and jurisdiction of the village level worker are accepted, another 51,200 village level workers, trained over a longer period, would be required. The existing training centres, with suitable modifications, should be adequate to train this number. (para 3.25).

CHAPTER IV—ANIMAL HUSBANDRY

54. It is estimated that 5,100 veterinary graduates would be required during the year 1957—61 of the Second Plan. The output from the veterinary colleges, on the basis of actual admissions, with a 30 per cent wastage, will be about 2,700. Two-year emergency courses specially arranged during the Second Plan would provide another 2,100 emergency certificate holders. The overall supply and demand position of veterinary personnel during the Second Plan period, thus appears to be satisfactory. There are, however, local surpluses and deficits which would need adjustment through co-operation among the States. (paras 4.2 and 4.3).

55. The proposal to start a veterinary college in Mysore is timely and measures should be taken to ensure the admission of the largest number of students from the first year onwards. (para 4.3).

56. If the setting up of National Extension Service Blocks is staggered upto 1963, the requirements of veterinary graduates during the Second Plan period would be considerably reduced; in that case there will be a surplus of veterinary personnel by March, 1961. (para 4.3).

57. The present wastage of students in veterinary colleges is of the order of 30 per cent. We would suggest that the institutions concerned should examine this carefully and try to reduce the wastage to the minimum. (para 4.4).

58. The number of existing posts for post-graduate degree holders is about 400 and the number that will be sanctioned during the remaining years of the Second Plan will be 200. The facilities for post-graduate

training in veterinary science in India are extremely limited; consequently, a number of higher posts are held by persons not having a post-graduate degree. It is essential, therefore, that the modest recommendations made by the Joint Indo-American Team on Agricultural Research and Education to develop four existing veterinary colleges into centres of post-graduate research and training and to establish a post-graduate college at the Indian Veterinary Research Institute, during the Second Plan period, should be implemented with all speed. (para 4.5).

59. The existing arrangements for training stockmen during the Second Plan period appear to be adequate. (para 4.6).

60. During the Third Plan period, it should be our endeavour to provide better veterinary service by opening more hospitals/dispensaries. Over and above the additional hospitals proposed under the Second Plan there would be need for the establishment of 4,000 hospitals/dispensaries. during the Third Plan period, raising the total number to 8,550 on the basis of one institution per 25,000 cattle. (para 4.7).

61. For giving advice to farmers on the many livestock problems, the veterinary officers would require competent advice from specialists. We consider that provision should be made for four subject-matter specialists with post-graduate training to be appointed at each district headquarters. (para 4.8).

62. By the end of the Second Plan, 350 "key village" centres are expected to be in operation. Another 150 centres may be added during the Third Plan period so that there will be at least 20 centres covering an adult cow buffalo population of 100,000 in each of the 25 important breeding tracts. (para 4.9).

63. The programme for the development of poultry initiated under the Second Plan may be intensified, and 300 more Extension centres added during the Third Plan period. (para 4.9).

64. Similarly, in connection with sheep development work, an additional 400 Sheep Extension Centres may be set up. (para 4.9).

65. It is expected that, by the end of the Second Plan, facilities for post-graduate training would have been provided in four veterinary colleges and at the Indian Veterinary Research Institute. A few more colleges may also be equipped to undertake post-graduate research during the Third Plan period. (para 4.10).

66. The proposal to establish regional livestock research stations which could not be given effect to during the Second Plan period, should be implemented under the Third Plan. In addition, the States should also strengthen their machinery for livestock research. (para 4.10).

67. We estimate the requirements of veterinary graduates during the Third Plan period at 6,800. On the assumption that the new veterinary college in Mysore and the Agricultural University, Rudrapur (U. P.), will admit about 100 students from 1958-59 respectively, the output of veterinary graduates during the Third Plan period, with a 10 per cent wastage, is estimated at about 5,800. There will, thus, be a shortage of about 1,000 veterinary graduates during the Third Plan period which could be made good in the first year of the Fourth Plan (para 4.12).

68. Taking a long range view, we feel that the maximum use of the existing institutions together with the new institutions proposed to be set up in Mysore and the Agricultural University at Rudrapur (U. P.), may be adequate to meet our needs. (para 4.12).

69. However, if any State feels the need for setting up a new veterinary college to remove local imbalances, the proposal should deserve consideration provided certain conditions are fulfilled. (para 4.12).

70. The requirements of persons with post-graduate qualifications in animal husbandry and veterinary science during the Third Plan period will be about 1,000. The four colleges and the Indian Veterinary Research Institute which are proposed to be developed into centres of post-graduate research and training would meet this requirements. (para 4.13).

71. After making an allowance for 2,250 stockmen likely to be available by the end of the Second Plan, the additional requirements of stockmen under the Third Plan would be about 30,000. About 70 training centres may be necessary to meet this demand, each centre admitting 100 candidates every year. The State should establish training centres during the last year of the Second Plan so that the first batch of persons may become available during the first year of the Third Plan. (para 4.14).

CHAPTER V—DAIRYING

72. Judged by the lowest recommended standard of 10 oz. of milk per diem for an adult Indian, the available supply of milk is inadequate, to a varying extent, all over India, except the Punjab. As the population continues to increase annually at the rate of $1\frac{1}{4}$ to $1\frac{1}{2}$ per cent, even the present unsatisfactory position cannot be expected to improve sufficiently unless milk production can be increased at a rate considerably faster than the growth of population. (para 5.1).

73. The price the primary producer gets for milk is poor, and it gives him no inducement to produce more. A remunerative market for milk should induce him to produce more milk. (para 5.1).

74. Since disposal of milk for liquid consumption gives the best return, more emphasis has been laid on urban milk supply schemes under Second Plan. The programme envisaged has the objective of producing more and better milk, raising the level of milk consumption and assuring a better return to the primary producer. Its implementation should give the country the nucleus of an organised dairy industry. (para 5.2).

75. It is estimated that about 600 qualified dairy men and higher staff will be required for implementing the dairy development programme during the Second Plan period. The position regarding basic institutional training for this staff is not unsatisfactory. In-plant training will, however, be necessary for persons who will be responsible for running the commercial milk supply schemes, *e.g.*, managers, engineers etc. (paras 5.5 and 5.6).

76. It is important to make full use of the existing instructional facilities, particularly at the National Dairy Research Institute, Karnal. (para 5.7).

77. The aim during the Third Plan period should be to set up milk supply schemes for all cities with a population exceeding 50,000 and to find out a market for milk remaining un-tapped in important "milk

pockets" by the establishment of milk products factories in such areas. We have assumed that milk supply schemes may have to be taken up in 120 cities, and milk products factories in 9 areas. (para 5.8).

78. To provide specialist advice on problems relating to dairy development, it will be necessary to provide dairy specialists at the district level and Extension officers, having training in dairying, at the Block level. We have assumed that during the Third Plan period such Extension officers/specialists in dairying will be posted in 500 Blocks and 100 districts. (para 5.9).

79. The requirements of technical personnel of different categories for the milk supply schemes during the Third Plan period will be of the order of 3,300. (para 5.10).

80. To provide training facilities for the technical personnel required, the existing training facilities at Bangalore for I.D.Ds. will have to be considerably increased and a similar course will have to be started at the National Dairy Research Institute, Karnal and at the two Regional Stations (in the east and the west) which are to come into being during the Second Plan period. Similarly, the training facilities for B. Sc. (Dairying) at the National Dairy Research Institute, Karnal will have to be considerably increased. The proposal to institute a separate course in dairy husbandry at this Institute should be implemented as early as possible. (para 5.12).

81. The requirements of dairy engineers, dairy chemists and dairy bacteriologists are likely to be met from the existing Universities and no special arrangements are necessary, except in-plant training which should be organised in the various milk supply projects. (para 5.12).

CHAPTER VI—FISHERIES

82. Development of fisheries in a systematic manner in India was taken up comparatively recently. The number of posts in June, 1957 under the categories of administrative personnel, research personnel, personnel for fishing vessels and engineers was 760 of which 640 were filled up: The requirements during the years 1957—61 of the Second Plan will be 630. Of this, what may be called senior positions is 170 and junior positions 460. (paras 6.1 to 6.5).

83. There are no facilities for institutional training in India for the senior administrative and research personnel. They have to depend entirely on foreign training after obtaining a good degree in zoology in an Indian University. The Central Fisheries Research Stations also train a few persons in fisheries biology. These arrangements are hardly satisfactory. (para 6.6).

84. Junior administrative personnel required for inland fisheries work are trained at the Central Inland Fisheries Research Station, Calcutta, but the training expenses are very high. During 1957—61 about 125 candidates can be trained. Training capacity can, without much difficulty, be expanded. But unless the training expenses are reduced the expanded facilities may not be fully utilised. (para 6.6).

85. Training of senior personnel for fishing vessels is at present being done only at the Deep Sea Fishing Station at Bombay. About 20 persons are expected to be trained during the Second Plan period. This will not meet the total requirements, but the shortage will not be sharply felt immediately since some of the bigger fishing vessels for exploitation of off-shore fishery resources are not likely to be acquired. (para 6.6).

86. There are also no regular facilities for institutional training for the junior personnel for operating fishing vessels. However, some of the fishermen who are receiving training in the power fishing boats under the Fisheries Community Project in Kerala State, can meet part of the requirements for such junior personnel. (para 6.6).

87. It is time that the *ad hoc* arrangements for training of fisheries personnel are replaced by a regular system of institutional training to prepare candidates for taking higher positions in Government and in the industry. A proposal of the Ministry of Food and Agriculture to establish a higher training institution to provide composite training in all aspects of fisheries is, therefore, opportune and we recommend that the institution should be established early. (paras 6.6 and 6.7).

88. With a properly organised fishing fleet using modern craft and gear, fish production in the country could be increased several times the present quantity. The objective should be to organise marine fisheries development on proper lines so as to make it possible for Indian capital to start this industry on a large scale with foreign assistance wherever necessary. (para 6.8).

89. Similarly, there is scope for developing inland fisheries throughout the country. (para 6.8).

90. The fisheries programme initiated during the current Plan will need to be continued and further expanded during the Third Plan period with special attention to the development of off-shore fishing, inland fisheries, transport and marketing, establishment of fisheries co-operatives, and strengthening of research machinery. (paras 6.9 and 6.10).

91. The weakest link in fisheries development is on the organizational side. We suggest that fisheries developmental staff should be organised on the basis of fisheries districts which may vary in size from State to State. Such staff should receive the assistance of specialists in different fields. (para 6.11).

92. On the basis of our suggestions the specialists required during the Third Plan period will be 620 and the administrative personnel 350. (para 6.12).

93. The facilities for training the specialists during the Third Plan period could be found from within the existing institutions except that new training facilities will have to be established for training fisheries co-operative personnel. Existing facilities for the training of marine engineers and master fishermen will also have to be expanded. Similarly, higher training in special subjects should continue to be given in foreign countries to selected persons. (para 6.13).

94. With regard to training of fisheries administrative personnel the proposed higher training institution, if established towards the end of 1958, would be able to turn out 300 qualified personnel against the desirable number of 350. The balance will be trained only after 1966. (para 6.13).

95. As regards foreign training wherever necessary, we feel that Japan would be most suitable in all fields except fish conservation and management for which training in the U.S.A. would be preferable. We suggest that the possibility of sending more persons for training in Japan may be explored. The language difficulty may be overcome by selecting the right

type of persons and teaching them Japanese language for about a year before deputation. (para 6.14).

CHAPTER VII—FORESTRY

96. It is estimated that during the Second Plan period facilities will be required to train 250 Forest Officers and 700 Rangers. With the expansion undertaken in 1956, the training facilities at the Indian Forest College and at the Rangers' colleges, these requirements would be met in full. (para 7.4).

97. We would suggest that the surplus capacity in any year after meeting the requirements of the States should not be left idle, but fully utilised by offering admissions to private candidates and by giving them fee concessions. (para 7.5).

98. It is estimated that the total trained personnel required during the Third Plan period would be about 80 Forest Officers and 160 Rangers. The present training facilities are adequate to meet the demands. (para 7.7).

99. The annual requirements of Foresters is of the order of 350 to 400 and the present training facilities in the Forest Schools appear to be adequate. (para 7.8).

100. For higher technological work, as in the plywood or paper industry, the Forest Research Institute organises *ad hoc* courses of training at which 6 to 12 men with necessary basic qualifications are accepted for a six to twelve months' course at a time. These courses are flexible and could be expanded, if need arises. (para 7.9).

101. The entire forestry training is given in India. It is necessary, therefore, that the various foreign scholarship schemes should be utilised for sending a few officers each year for useful advanced and specialised courses in forestry to countries where facilities for such courses are available so that they could bring back with them experience and knowledge of modern trends. (para 7.10).

CHAPTER VIII—SOIL CONSERVATION

102. Soil erosion is the most serious prevalent disease of the land. Research data shows that unless suitable soil conservation measures are adopted, a vast proportion of the now productive areas will automatically go out of production. (paras 8.1 and 8.2).

103. A target of 200 million acres appears to be the minimum where soil conservation should be concentrated during the next 25 to 30 years. (para 8.2).

104. In the Second Plan period, soil conservation work has to be undertaken in a concerted manner on nearly 3 million acres. It is estimated that the programme would require nearly 5,200 technically trained personnel of 3 different categories—viz., (1) Officers, (2) Assistants and (3) Sub-assistants. (para 8.5).

105. The requirements of officers would be fully met by the training centre set up by the Government of India at Dehra Dun, provided the State Governments take steps to depute at least 50 officers each year during 1958-59, 1959-60 and 1960-61. The centre is equipped to train 20 officers at a time, but the facilities could easily be expanded to cater for about 50 per year. (para 8.6).

106. Similarly, the required number of Assistants could be trained if the admissions to four training centres established by the Government of India at Kotah, Ballary, Ootacamund and Hazaribagh are increased from 80 to 140; which is feasible. (para 8.7).

107. The existing capacity in these training centres is not being fully utilised by the State Governments, who depute candidates against guaranteed appointments. We recommend that any vacancies left after meeting the requirements of the State nominees may be offered to private candidates without the guarantee of appointments. A suitable stipend may be necessary to attract such candidates. (para 8.8).

108. A short refresher course of 3 months' duration at present arranged at Dehra Dun for the benefit of administrative officers could, with advantage, be continued as a long-term arrangement. (para 8.9).

109. Sub-assistants are trained by the States at centres run by them. It is hoped that the required number of Sub-assistants will be trained by the end of the Second Plan. (para 8.10).

110. During the Third Plan period, training facilities should be progressively increased to train additional 340 Officers, 1,700 Assistants and 6,800 Sub-assistants. (para 8.11).

111. The existing training centres, with a little expansion of their facilities, together with the additional centres for sub-assistants being set up during the Second Plan, should be adequate for training these personnel during the Third Plan period. (para 8.11).

112. With increasing recognition soil conservation is receiving as a measure of preserving soil fertility, the demand for trained personnel is bound to increase. Consequently, the recruitment and training of soil conservation personnel would require to be lifted from the present rather temporary and make-shift arrangements and placed on a sound and permanent footing. (para 8.13).

113. Taking a forward look, we feel that the training facilities should be increased progressively during the Fourth and Fifth Plan periods, to train staff for 260 working units (each unit consisting of one Officer, 5 Assistants and 20 Sub-assistants to manage 5,000 acres) in the last year of the Fifth Plan. It should be feasible to achieve this target with some expansion of the training facilities at the existing centres. (para 8.13).

114. It is realistic to assume that the soil conservation measures recommended as the minimum, are likely to be achieved by the end of the Seventh Plan period. (para 8.13).

115. The large number of trained personnel required for soil conservation work could be found only if permanent additions are made to the cadres of the departments concerned in order to ensure optimum utilisation of the training centres. In the alternative, a separate soil conservation cadre may be formed. (para 8.14).

116. The introduction of soil conservation to form a separate subject in the teaching of curricula of the Agricultural, Forestry and Agricultural Engineering Colleges in the country, would help to provide personnel well equipped to undertake soil conservation training in future years. (para 8.15).

117. For proper leadership at higher levels for planning, direction and supervision, we feel that it would be appropriate from now on to select promising officers and give them suitable training in India and abroad to hold key positions in this important service. (para 8.16).

118. Soil conservation, apart from being a measure of defence and restoration of soil productivity, provides a great potential for gainful rural employment. Each million acre that will be protected by soil conservation measure will provide 20 million man-days of employment. (para 8.17).

CHAPTER IX—AGRICULTURAL MARKETING

119. The requirements of graduate technical personnel for marketing work during 1957—61 are estimated at 430. Personnel with basic qualifications would be available. (para 9.3).

120. The Central Marketing Directorate arranges training in agricultural marketing for State nominees. The training facilities are not being fully utilised because of the high cost of training; but the training facilities are adequate and, subject to a sufficient number of deputationists from the States, the requirements will be fully met. The surplus capacity after meeting the requirements of the States should be utilised for admitting private candidates. (para 9.4).

121. The total additional requirements of graduate technical personnel for the centre and the States during the Third Plan period would be of the order of 700. Of this about 330 would need to be graduates in agriculture with specialisation in agricultural economics; and a 100 would need to have post-graduate degree in agricultural economics. (para 9.8).

122. The existing training centres and the nine regional laboratories and grading centres which are being set up during the Second Plan period would be adequate to give training in marketing for the required number of persons. (para 9.9).

123. The number of regulated markets will increase from 1,000 by the end of the Second Plan, to 1,800 by the end of the Third Plan. It would be necessary to provide for two more training centres: one in the northern region and the other in the southern region. (para 9.9).

124. We suggest that the senior marketing personnel may be sent in batches of 4 to 6 each year to foreign countries on study tours for a period of 3 to 4 months under the various foreign aid programmes to get acquainted with modern techniques of marketing followed in advanced countries. (para 9.9).

125. To popularise the techniques of preservation of fruits and vegetables on a cottage industry basis, it is necessary to impart training to producers in those Community Development and National Extension Service Blocks where horticulture is of sufficient importance. It is estimated that 400 centres may have to be opened during the Third Plan period for imparting this training. These centres should require about 400 teacher-demonstrators. (para 9.10).

126. The requirements of personnel for the fruit and vegetable preservation industry may be put down as 250 technicians. The total requirements of technical personnel would be of the order of 700. In-service training for these personnel could be imparted at the five Regional Fruit Research Stations. (para 9.10).

127. Facilities for post-graduate training at the Central Food Technological Research Institute, Mysore may have to be increased to meet the additional requirements under the Third Plan. The facilities available at some polytechnics and at some Universities may also be utilised. (para 9.10).

128. With the expansion of the fruit and vegetable preservation industry, there will be need to adopt modern methods of processing, packing and marketing. It will, therefore, be desirable to send one or two senior officers every year to foreign countries to acquaint themselves with the latest developments in the technology of fruit processing. (para 9.10.).

CHAPTER X—CO-OPERATION

129. For training the required number of co-operative personnel during the Second Plan period, the Government of India and the Reserve Bank have constituted a Central Committee for co-operative training and entrusted to it the responsibility of establishing the necessary training facilities. The requirements of trained personnel fall under 3 categories, viz., (1) senior personnel, (2) intermediate personnel, and (3) junior co-operative personnel. The training facilities set up and proposed to be expanded during the Second Plan period would meet the entire training requirements of all the 3 categories during that period. (paras 10.1 to 10.5).

130. The additional requirements of trained personnel, under the 3 categories during the Third Plan period, would be of the order of 39,000. (para 10.8).

131. The basic qualification required for the senior and the intermediate staff is a degree. Most of the existing personnel are arts, science and commerce graduates. A few agricultural graduates who have chosen to work in the co-operative departments have given a good account of themselves in jobs where agricultural background is an asset. We feel that an attempt should be made in the Third Plan period to employ agricultural graduates in at least 1/3rd of the posts in these two categories. On this assumption, the co-operative sector would absorb a minimum of 300 to 400 agricultural graduates with a post-graduate degree in agricultural economics and 2,500 agricultural graduates during the Third Plan period. (para 10.9).

132. With regard to in-service training of the senior personnel, an additional college for training may have to be opened, and the existing college at Poona will have to be expanded. The existing training institutions would be adequate, with suitable adjustments, to meet all the requirements of in-service training for the intermediate and junior category co-operative personnel. (para 10.10).

CHAPTER XI—AGRICULTURAL STATISTICS

133. In spite of the growing recognition for the need of qualified statisticians at research institutes and other organizations responsible for planning and conduct of experimental programmes, the rate of appointment of statisticians has been regrettably slow. If this situation is to be remedied, a far greater number of posts for qualified statisticians will have to be created and provision will have to be made for selecting and training necessary men to fill them. (para 11.2).

134. The staff required by statistical units may be broadly divided into 3 categories : (a) Research Statisticians who may be well-trained and have research ability; (b) Statistical Assistants who must have a good working knowledge of the most straight forward applications of statistics and methods of analysis; and (c) Computers having a working knowledge of the commoner computational methods. (para 11.6).

135. In all research institutes where there is a reasonable amount of statistical work, a minimum staff of 2 Research Statisticians would seem desirable, together with the necessary Statistical Assistants and Computers. (para 11.7).

136. There should be a minimum of 2 Research Statisticians in each State department. (para 11.8).

137. The possibility of integrating the statistical work of the various research departments in agricultural fields in a State into one strong unit should be explored. (para 11.8).

138. The statistical department of agricultural colleges and Universities, who may be expected to have at their disposal laboratories and experimental farms at which research work will be conducted, should have a position similar to the statistical units of research institutes, but the staff will have teaching as well as research duties. (para 11.9).

139. During the Second and Third Plans we may estimate the actual requirements of trained personnel at 300 Research Statisticians, 340 Statistical Assistants and 560 Computers. (para 11.10).

140. The only place in India at present giving specialised training in agricultural research statistics of the type recommended is the Statistical Wing of the Indian Council of Agricultural Research. We understand that the possibilities of integrating this training programme with that of the Indian Statistical Institute are at present being explored. If this comes about, students after selection would spend a year at the Indian Statistical Institute, taking the First (General) Part of the revised post-graduate course of the Institute and would then spend a further year at the Indian Council of Agricultural Research. (para 11.12).

141. It is hoped that in future a link-up with this arrangement and the Indian Agricultural Research Institute post-graduate training schemes may be possible. (para 11.12).

142. It is considered that with the rearrangement proposed the annual in-take to the diploma course conducted by the Statistical Wing of the Indian Council of Agricultural Research can be safely increased to a maximum of 30. A total number of 300 students could thus be trained in the course of 10 years.

143. The existing courses of the Statistical Wing of the Indian Council of Agricultural Research with certain adjustments could meet the requirements of Statistical Assistants. (para 11.13).

144. The proposed expanded out-put of trainees by the I.C.A.R. will not fully meet the needs for Research Statisticians if the full expansion of agricultural research proposed in this Report takes place by the end of the Third Plan. We do not, however, think that any immediate increase in the rate of statistical training beyond what we have proposed above is essential. (para 11.14).

145. We consider it of utmost importance that if the I.C.A.R. Statistical Wing is to continue to perform its research functions properly, it should not be committed to too large a training programme. (para 11.14).

146. It is an essential pre-requisite of the extended training programme that arrangements are made for the creation of the necessary posts so that the trainees can be absorbed in the research and teaching structure. It is equally important that if a cadre of high standard is to be built up and maintained, that the initial scales of pay are comparable with those that can be obtained in other fields of activity requiring similar ability and training. (para 11.15).

147. In order to attract the most promising students for specialised training it is essential to provide scholarships for those entering post-graduate courses. (para 11.15).

CHAPTER XII—AGRICULTURAL ECONOMICS

148. A close collaboration of agricultural economists with other specialists is required to improve the long-term efficiency of all sectors of agriculture. (para 12.1).

149. Agricultural economics at the post-graduate level is taught in a few agricultural colleges and in some Universities and institutions. The candidates admitted to the latter have a basic degree in economics and not agriculture. We feel it would be necessary to provide for both types of training. (para 12.5).

150. For effective post-graduate research and teaching in agricultural economics, there should be a strong department of agricultural economics in at least one agricultural college in each State, under an Officer of Class I status with adequate support at lower levels. The Professor of agricultural economics could also be the Agricultural Economist to the State Government and have necessary research support. This should be arranged during the Third Plan period. (para 12.5).

151. It is also necessary that all the major Commodity Committees should have their own agricultural economic sections. (para 12.5).

152. In addition to the agro-economic research centres initiated during the Second Plan period, it may be necessary to set up two centres during the Third Plan period so as to cover adequately all the broad regions within the country. (para 12.5).

153. Under the Third Plan we expect 40 new Farm Management Units to be established to cover the whole country, grouped into 14 Regional Centres one in each State. (para 12.5).

154. It is assumed that, a total number of 100 new *ad hoc* research schemes in agricultural economics may be initiated during the Third Plan period. (para 12.5).

155. We have assumed that during the Third Plan period, about half the number of districts and about 500 blocks may be covered by the Farm Management Extension Service. (para 12.5).

156. The total requirements of persons with Doctorate in agricultural economics is 20 and of those with post-graduate degrees in agricultural economics 700, and of graduates in agriculture with training in agricultural

economics will be about 1,350. These requirements have been taken into account in the training facilities proposed in the chapter on 'Agriculture'. (para 12.6).

157. We understand that the Agricultural Economics Committee of the Indian Council of Agricultural Research, New Delhi, is at present engaged in drawing up a suitable syllabus for the course in agricultural economics at the graduate and post-graduate levels in the agricultural colleges. We suggest that this Committee may also go into the question of teaching agricultural economics in the Universities and make recommendations on the subject. (para 12.7).

158. We suggest that the University Grants Commission may take up the question of expanding and improving facilities for teaching of and research in agricultural economics at the Universities. (para 12.7).

CHAPTER XIII—AGRICULTURAL ENGINEERING

159. The subject of agricultural engineering has, by and large, not received adequate attention in India. (para 13.2).

160. The total requirements of graduates in agricultural engineering during the period 1957 to 1961 is about 80. The out-put from the Agricultural Institute, Allahabad and the Institute of Technology, Kharagpur is about 30 a year; and this would be adequate to meet the needs during the remaining years of the Second Plan. (para 13.2).

161. With the increase in the number of land development measures that are being undertaken, adequate arrangements would be necessary to intensify research, application and teaching in agricultural engineering. (para 13.3).

162. In the chapter on 'Agriculture' we have emphasised the need to develop at least one college in each State as a centre for post-graduate research and teaching during the Third Plan period; one of the disciplines in these colleges should be agricultural engineering. (para 13.3).

163. Agricultural Engineering Sections in the States and at the Central Institutes would require strengthening during the Third Plan period. (para 13.3).

164. We have assumed also that during the Third Plan period specialists/ Extension Officers in agricultural engineering will be provided in selected districts/Blocks.

165. The requirements of graduates in agricultural engineering during the Third Plan period would be about 200 per year. (para 13.3).

166. We endorse the suggestions of the Engineering Board set up by the Ministry of Education and Scientific Research that courses in agricultural engineering should be started on a regional basis in engineering colleges at selected centres having an agricultural college close by. (para 13.4).

167. Attempts should be made to increase the employment opportunities for agricultural engineers during the Third Plan period. (para 13.5).

CHAPTER XIV—PLANT PROTECTION

168. At least half the total gross area of about 350 million acres under cultivation in India requires in a normal year intensive or continuous measures of plant protection. (para 14.2).

169. The expansion of plant protection activities during the Second Plan period has been more in the direction of providing greater resources for pesticides and equipment than towards increasing the staff. (para 14.3).

170. While the bulk of the plant protection measures would be undertaken by the farmers themselves on an annually expanding scale, governmental measures should be directed largely towards providing technical advice and material assistance. The most effective way of doing this is to provide each Block with a qualified Plant Protection Extension Officer of the graduate type, supported by a specialist (with a post-graduate degree) at the district level. (para 14.4).

171. The Central and State organisations would require a small addition to their staff. (para 14.4).

172. The total requirements of graduate technical personnel for plant protection work during the Third Plan period will be 5,800 of whom about 2,900 will be graduates in agriculture. These requirements have been accounted for in the chapter 'Agriculture'. (para 14.5).

173. The existing Regional Stations of the Central Plant Protection Organisation would be adequate for giving in-service training to the required number of personnel. (para 14.6).

TABLES 1 to 29

TABLE 1

NUMBER OF STUDENTS IN THE FIRST YEAR DURING 1951—57 AND THE NUMBER OF GRADUATES (B. SC. AGRICULTURE) TURNED OUT DURING 1954—57.

Name of the College		Duration of Course (Yrs.)	Capacity (1957-58)	Enrolment in the first year							Graduates turned out			
(1)	(2)			51-52	52-53	53-54	54-55	55-56	56-57	57-58	53-54	54-55	55-56	56-57
				(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
<i>Northern Zone :</i>														
1. Government Agricultural College, Ludhiana	..	4	80	44	50	60	71	66	76	80	51	45	36	41
2. Khalsa College, Amritsar	..	4	70	55	52	70	72	72	73	65	26	29	9	19
3. S. K. N. R. College, Jobner	..	4	60	20	20	21	41	48	60	53	6	15	10	14
4. Agricultural College, Udaipur	..	3	80	—	—	—	—	46	53	101	—	—	—	—
5. Central College of Agriculture, Delhi	..	3	(closed)	45	50	42	49	58	59	—	33	26	28	36
TOTAL	..		290	164	172	193	233	290	321	299	116	115	83	110
<i>Central Zone :</i>														
6. Agricultural College, Kanpur	..	4	180	73	53	60	56	72	100	117	66	78	38	66
7. Agricultural Institute, Allahabad	..	4	80	70	69	63	66	70	73	77	57	64	64	52
8. College of Agriculture, Benaras	..	3	70	70	44	56	65	71	73	46	47	54	62	59
9. College of Agriculture, Benaras	..	4	150	—	33	29	16	25	66	146	20	13	9	18
9. Jat College, Lakhaoti	..	4	60	83	58	66	70	70	73	75	39	43	34	55
10. B. R. College, Agra	..	4	100	—	—	26	27	26	48	102	—	—	—	13
11. Jat Vedic College, Baraut	..	4	64	—	—	—	—	64	64	64	—	—	—	—
12. Agricultural College, Jabalpur	..	2	40	—	—	—	—	9	12	23	—	—	—	8
13. R. A. K. A. Institute, Sehore	..	4	80	56	46	57	57	74	84	84	18	34	15	28
14. College of Agriculture, Gwalior	..	4	90	—	—	—	25	56	56	88	—	—	—	—
15. Darbar College, Rewa	..													
TOTAL	..		914	352	303	357	382	537	649	822	247	286	222	299

TABLE 1—Contd.
NUMBER OF STUDENTS IN THE FIRST YEAR 1951—57 AND THE NUMBER OF GRADUATES (B. SC. AGRICULTURE) TURNED OUT DURING 1954—57)

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
<i>Eastern Zone :</i>													
16. Agriculture College, Calcutta	3	40	—	36	40	42	39	40	40	—	33	33	37
17. Agriculture College, Sabour	3	70	38	70	61	72	85	84	70	71	46	69	72
18. Agriculture College, Ranchi	3	80	—	—	—	—	85	94	82	—	—	—	—
19. Assam Agriculture College, Jorhat	4	70	20	12	16	16	55	70	63	12	15	12	14
20. Utkal Krishi Vidhyala, Cuttack	4	32	—	—	—	32	35	32	29	—	—	—	—
TOTAL ..		292	58	118	117	162	299	320	284	83	94	114	123
<i>Western Zone :</i>													
21. B. A. College of Agriculture, Anand	4	100	63	62	43	70	83	100	204	55	52	46	54
22. College of Agriculture, Poona	4	150	89	88	118	149	145	168	165	49	30	39	54
23. College of Agriculture, Nagpur	4	128	64	128	96	128	96	64	128	47	48	69	102
24. Agricultural College, Akola	4	80	—	—	—	—	64	63	64	—	—	—	—
25. Agricultural College, Dharwar	4	100	34	35	46	62	93	100	100	28	22	15	22
26. Agricultural College, Hebal	3	100	48	48	60	80	96	96	98	27	18	47	14
27. Agricultural College, Parbhani	3	60	—	—	—	—	—	31	31	—	—	—	—
TOTAL ..		718	298	361	363	489	577	625	790	206	170	216	273

Southern Zone :

28. Agricultural College, Coimbatore	3	160	60	91	96	108	108	162	162	51	88	73	91
29. Agricultural College, Bapatla	3	96	96	96	96	48	96	96	144	61	69	65	44
30. Agricultural College, Hyderabad	3	64	32	62	32	32	32	48	80	28	64	35	31
31. Agricultural College, Vellayani	3	80	—	—	—	—	50	80	80	—	—	—	—
TOTAL ..		400	188	249	224	188	286	386	466	140	221	173	166
GRAND TOTAL ..		2614	1060	1203	1254	1454	1989	2301	2661	792	886	808	971

NOTES :—1. Enrolment numbers in the first year for 1951-52 and 1952-53 for the Jobner College, and for 1951-52 for the Coimbatore and Hyderabad Colleges are estimates. Similarly, admission capacity of the Barat College is estimated.

2. The Sehore Institute admits students only in the third year of the B. Sc. course.

3. In the Agricultural Colleges in U.P., students join in the third year of the B.Sc. agriculture course after passing I. Sc. in agriculture from other intermediate colleges in the State. As such admission in the first year do not determine the entire group attending the final year course of B. Sc.

4. Admission capacity at Anand is 100, but due to heavy rush, however, two shifts, each of about 100 students have been started during 1957-58.

TABLE 2

NUMBER OF SANCTIONED AND FILLED POSITIONS AS ON JUNE, 1957 FOR GRADUATE PERSONNEL IN AGRICULTURAL SECTOR.

(1)	Degree in agriculture essential		Degree in agriculture preferred		Degree holders in Agriculture eligible		Degree in agriculture not required		Total	
	sanctioned	filled	sanctioned	filled	sanctioned	filled	sanctioned	filled	sanctioned	filled
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
<i>Northern Zone :</i>										
Punjab	465	420	390	370	—	—	670	475	1,525	1,265
Rajasthan	420	310	175	140	165	150	340	225	1,100	825
Jammu and Kashmir	170	150	75	25	30	25	120	100	395	300
Himachal Pradesh	110	100	80	70	—	—	140	100	330	270
Delhi	15	10	5	5	25	25	20	15	65	55
TOTAL	1,180	990	725	610	220	200	1,290	915	3,415	2,715
<i>Central Zone :</i>										
Uttar Pradesh	1,505	1,400	995	960	—	—	1,265	1,015	3,765	3,375
Madhya Pradesh	1,045	925	275	265	350	320	670	520	2,340	2,030
TOTAL	2,550	2,325	1,270	1,225	350	320	1,935	1,535	6,105	5,405
<i>Eastern Zone :</i>										
West Bengal	395	355	125	115	300	275	760	610	1,580	1,355
Bihar	1,240	1,035	215	180	660	640	960	630	3,075	2,485
Assam	290	285	35	35	245	225	270	250	840	795
Orissa	285	220	55	40	240	235	870	785	1,450	1,280
Tripura	25	15	—	—	20	20	45	30	90	65
Manipur	20	15	—	—	25	20	15	15	60	50
N. E. F.A.	15	10	—	—	20	15	20	15	55	40
Andamans	10	5	—	—	5	5	20	15	35	25
TOTAL	2,280	1,940	430	370	1,515	1,435	2,960	2,350	7,185	6,095

Western Zone :

Bombay	..	..	..	1,050	935	350	320	485	370	1,090	1,005	2,975	2,630
Mysore	..	..	..	380	340	115	105	410	335	360	345	1,265	1,125
TOTAL	..	..	..	1,430	1,275	465	425	895	705	1,450	1,350	4,240	3,755
<i>Southern Zone :</i>													
Madras	..	..	..	915	765	565	555	105	105	990	810	2,575	2,235
Andhra	..	..	..	760	650	130	85	830	830	900	780	2,620	2,345
Kerala	..	..	..	255	240	30	25	250	225	420	260	955	750
Pondicherry	..	..	..	—	10	—	—	10	10	30	25	55	45
TOTAL	..	..	..	1,945	1,665	725	665	1,195	1,170	2,340	1,875	6,205	5,375
All States	..	..	..	9,385	8,198	3,615	3,295	4,175	3,830	9,975	8,025	27,150	23,345
Centre	..	..	..	1,235	835	435	340	—	—	760	580	2,430	1,755
Miscellaneous	..	..	..	—	—	650	600	—	—	—	—	650	600
TOTAL	..	..	..	10,620	9,030	4,700	4,235	4,175	3,830	10,735	8,605	30,230	25,700

NOTES : —

1. Agriculture sector includes agriculture, animal husbandry and veterinary, co-operation, dairying, fisheries, agricultural statistics, agricultural economics, agricultural engineering, forestry, agricultural marketing, soil conservation and plant protection.

2. All figures rounded to nearest 5.

TABLE 3

NUMBER OF SANCTIONED POSITIONS INCLUDING VACANT POSITIONS AS ON JUNE, 1957 FOR WHICH DEGREE IN AGRICULTURE IS ESSENTIAL OR PREFERRED OR AGRICULTURE DEGREE HOLDERS ARE ELIGIBLE FOR APPOINTMENT.

			Agricultural development and extension	Agricultural research.		Agricultural education.		Agricultural marketing		Soil conser- vation		Co.operation		Block development officers.		Total		
			<i>e</i>	<i>e</i>	<i>p</i>	<i>e</i>	<i>p</i>	<i>e</i>	<i>p</i>	<i>e</i>	<i>p</i>	<i>p</i>	<i>el</i>	<i>p</i>	<i>el</i>	<i>e</i>	<i>p</i>	<i>el</i>
(1)			(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)
<i>Northern Zone :</i>																		
Punjab	..	..	201	176	73	68	17	15	—	5	1	200	—	100	—	465	391	—
Rajasthan	..	..	255	43	51	107	8	—	23	15	—	166	90	—	—	420	172	166
Jammu and Kashmir	..	..	150	8	17	3	—	—	—	9	3	57	—	—	28	170	77	28
Himachal Pradesh	..	..	82	16	12	6	—	6	—	—	3	42	—	26	—	110	83	—
Delhi	..	..	16	—	—	—	—	—	2	—	—	—	21	—	5	16	2	26
TOTAL ..			704	243	153	184	25	21	25	29	7	299	187	216	33	1,181	725	220
<i>Central Zone :</i>																		
Uttar Pradesh	..	..	880	209	41	379	149	2	—	37	13	485	—	303	—	1,507	991	—
Madhya Pradesh	..	..	815	107	8	109	66	—	3	14	5	—	350	194	—	1,045	276	350
TOTAL ..			1,695	316	49	488	215	2	3	51	18	485	350	497	—	2,552	1,267	350
<i>Eastern Zone :</i>																		
West Bengal	..	..	252	78	35	60	5	—	81	5	1	—	200	—	100	395	122	300
Bihar	..	..	662	371	134	177	43	—	27	30	10	—	447	—	215	1,240	214	662
Assam	..	..	208	19	31	50	—	2	1	11	4	—	180	—	64	290	36	244
Orissa	..	..	160	60	40	54	6	—	5	11	4	—	145	—	97	285	55	242
Tripura	..	..	20	—	—	3	1	1	—	—	—	—	13	—	6	24	1	19
Manipur	..	..	20	—	—	—	—	—	—	—	—	—	20	—	5	20	—	25
NEFA	..	..	15	—	—	—	—	—	—	—	—	—	15	—	7	15	—	22
Andamans	..	..	8	1	—	—	—	—	—	—	1	—	2	—	—	9	1	2
TOTAL			1,345	529	240	344	55	3	114	57	20	—	1,022	—	494	2,278	429	1,516

Western Zone :

Bombay	..	..	431	174	281	289	34	34	8	122	29	—	275	—	210	1,050	352	485
Mysore	..	..	229	21	41	87	39	7	8	36	29	—	300	—	108	380	117	408
TOTAL	..	..	660	195	322	376	73	41	16	158	58	—	575	—	318	1,430	469	893

Southern Zone :

Madras	..	..	581	241	68	75	35	12	3	6	20	439	—	—	107	915	565	107
Andhra	..	..	500	147	43	110	20	—	11	1	55	—	680	—	150	758	129	830
Kerala	..	..	154	53	21	44	7	2	—	2	1	—	193	—	55	255	29	248
Pondicherry	..	..	16	—	—	—	—	—	—	—	—	—	10	—	2	16	—	12
TOTAL	..	..	1,251	441	132	229	62	14	14	9	76	439	883	—	314	1,944	723	1,197
All States	..	..	5,655	1,724	896	1,621	430	81	172	304	179	1,223	3,017	713	1,159	9,385	3,613	4,176
Centre	..	..	353	814	290	—	—	35	75	33	57	15	—	—	—	1,235	437	—
Miscellaneous	..	..															650	—
GRAND TOTAL	..	..	6,008	2,538	1,186	1,621	430	116	247	337	236	1,238	3,017	713	1,159	10,620	4,700	4,176
																	19,496	
																	19,500 (rounded)	

NOTES:— *e*—essential.

p—preferred.

el—eligible—agriculture degree holders are eligible for appointment.

TABLE 4

NUMBER OF POSITIONS FILLED AS ON JUNE 1957 FOR WHICH DEGREE IN AGRICULTURE IS ESSENTIAL OR PREFERRED OR AGRICULTURE DEGREE HOLDERS ARE ELIGIBLE FOR APPOINTMENT.

(1)	Agricultural development and extension		Agricultural research		Agricultural education		Agricultural marketing		Soil conservation		Co-operation		Block development officers		Total		
	e		e	p	e	p	e	p	e	p	p	el	p	el	e	p	e
	(2)		(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)
<i>Northern Zone :</i>																	
Punjab	180		160	64	61	7	14	—	5	1	200	—	100	—	420	372	—
Rajasthan	215		37	28	56	7	—	12	2	—	—	150	90	—	310	137	150
Jammu and Kashmir	130		8	12	3	—	—	—	8	2	10	—	—	26	149	24	26
Himachal Pradesh	80		10	12	6	—	5	—	—	1	42	—	16	—	101	71	—
Delhi	11		—	—	—	—	—	2	—	—	—	20	—	5	11	2	25
TOTAL	616		215	116	126	14	19	14	15	4	252	170	206	31	991	606	201
<i>Central Zone :</i>																	
Uttar Pradesh	853		160	32	355	133	2	—	30	10	480	—	303	—	1,400	958	—
Madhya Pradesh	704		107	6	99	65	—	3	14	5	—	320	189	—	924	268	320
TOTAL	1,557		267	38	454	198	2	3	44	15	480	320	492	—	2,324	1,226	320
<i>Eastern Zone :</i>																	
West Bengal	231		65	32	54	5	—	80	5	1	—	180	—	93	355	118	273
Bihar	534		330	107	149	38	—	25	22	8	—	426	—	215	1,035	178	641
Assam	208		19	31	44	—	2	1	11	4	—	160	—	63	284	36	223

Orissa	120	43	27	49	6	—	4	8	2	—	145	—	92	220	39	237
Tripura	14	—	—	1	—	1	—	—	—	—	13	—	6	16	—	19
Manipur	15	—	—	—	—	—	—	—	—	—	15	—	5	15	—	20
N.E.F.A.	10	—	—	—	—	—	—	—	—	—	10	—	7	10	—	17
Andamans	5	1	—	—	—	—	—	—	—	—	2	—	—	6	—	2
TOTAL ..	1,137	458	197	297	49	3	110	46	15	—	951	—	481	1,941	371	1,432

Western Zone :

Bombay	388	129	265	270	17	32	8	116	26	—	200	—	170	935	316	370
Mysore	203	20	38	80	36	6	6	31	29	—	250	—	84	340	109	334
TOTAL ..	591	149	303	350	53	38	14	147	55	—	450	—	254	1,275	425	704

Southern Zone :

Madras	466	214	63	67	30	12	3	6	20	436	—	—	107	765	552	107
Andhra	420	127	43	102	18	—	4	1	21	—	680	—	150	650	86	830
Kerala	154	47	19	36	5	2	—	1	—	—	172	—	53	240	24	225
Pondicherry	9	—	—	—	—	—	—	—	—	—	10	—	2	9	—	12
TOTAL ..	1,049	388	125	205	53	14	7	8	41	436	862	—	312	1,664	662	1,174

All States	4,950	1,477	779	1,432	367	76	148	260	130	1,168	2,753	698	1,078	8,195	3,290	3,831
Centre	330	449	211	—	—	36	69	20	48	10	—	—	—	835	338	—
Miscellaneous	—	—	—	—	—	—	—	—	—	—	—	—	—	—	600	—
GRAND TOTAL ..	5,280	1,926	990	1,432	367	112	217	280	178	1,178	2,753	698	1,078	9,030	4,228	3,831

17,089
17,100 (rounded)

NOTES :— e—essential.

p—preferred.

el—eligible—agriculture degree holders are eligible for appointment.

TABLE 5

ESTIMATED NUMBER OF AGRICULTURAL GRADUATES IN POSITION AS ON JUNE, 1957

				<i>Agriculture</i>	<i>Allied fields</i>	<i>Total</i>
(1)				(2)	(3)	(4)
<i>Northern Zone :</i>						
Punjab	..	..	..	430	85	515
Rajasthan	..	..	..	310	90	400
Jammu and Kashmir	..	..	..	150	10	160
Himachal Pradesh	..	..	..	105	10	115
Delhi	..	..	..	16	3	19
TOTAL	..	..	..	1,011	198	1,209
<i>Central Zone :</i>						
Uttar Pradesh	..	..	..	1,445	295	1,740
Madhya Pradesh	..	..	..	940	135	1,075
TOTAL	..	..	..	2,385	430	2,815
<i>Eastern Zone :</i>						
West Bengal	..	..	..	360	135	495
Bihar	..	..	..	1,050	190	1,240
Assam	..	..	..	290	55	345
Orissa	..	..	..	220	65	285
Tripura	..	..	..	18	2	20
Manipur	..	..	..	15	2	17
N.E.F.A.	..	..	..	10	2	12
Andamans	..	..	..	6	—	6
TOTAL	..	..	..	1,969	451	2,420
<i>Western Zone :</i>						
Bombay	..	..	..	960	285	1,245
Mysore	..	..	..	350	125	475
TOTAL	..	..	..	1,310	410	1,720
<i>Southern Zone :</i>						
Madras	..	..	..	775	145	920
Andhra	..	..	..	660	170	830
Kerala	..	..	..	245	45	290
Pondicherry	..	..	..	9	1	10
TOTAL	..	..	..	1,689	361	2,050
All States	..	..	..	8,364	1,850	10,214
Centre	..	..	..	700	150	850
Miscellaneous	..	..	..	..	..	200
TOTAL	..	..	..			11,264
						11,300
						(rounded)

NOTES:—1. Agriculture includes agricultural development and extension agricultural research and agricultural education.

2. Allied fields includes personnel employed in agricultural marketing, soil conservation, co-operation, animal husbandry and dairying, etc.

TABLE 6

ESTIMATED NUMBER OF POSITIONS FOR GRADUATE PERSONNEL TO BE SANCTIONED DURING THE PERIOD JULY, 1957 TO MARCH, 1961 (INCLUDING VACANT POSITIONS TO BE FILLED UP) FOR WHICH DEGREE IN AGRICULTURE IS EITHER ESSENTIAL OR A PREFERRED QUALIFICATION.

					<i>Number of positions to be sanctioned</i>	<i>Number of positions likely to be filled up by agricultural graduates, if available</i>
(1)					(2)	(3)
Agricultural development and extension	..	..			4,500	4,500
Agricultural research	..	..	..	..	1,300	1,050
Agricultural education	..	..	..		550	440
Agricultural marketing	..	..	..	..	440	250
Soil conservation	..	..	..	..	1,200	600
Co-operation	..	..	..	..	4,600	950
Block development officers	..	..	..		3,440	1,050
Miscellaneous	..	..	..	..	100	100
TOTAL					16,130	8,940

NOTES:—1. In the Punjab, Jammu and Kashmir, Himachal Pradesh and Uttar Pradesh degree in agriculture is a preferable qualification for filling a large number of positions in co-operation. In Madras agricultural graduates are preferred along with commerce and economics graduates for filling posts in co-operation.

2. In the Punjab, Rajasthan, Himachal Pradesh, Uttar Pradesh, and Madhya Pradesh degree in agriculture or experience in revenue is considered a preferable qualification for filling posts of block development officers.

TABLE 7

ESTIMATED REQUIREMENT OF AGRICULTURAL GRADUATES AND EXPECTED OUTTURN DURING THE PERIOD JULY, 1957 TO MARCH, 1961.

(1)	Requirements		Total	Outturn during 1957-61	Surplus+ or deficit (—)
	Agriculture	Allied fields			
(2)	(3)	(4)	(5)	(6)	
Northern Zone :					
Punjab	217	250	467	380	—87
Rajasthan	320	150	470	200	—270
Jammu and Kashmir	148	70	218	—	—218
Himachal Pradesh	27	30	57	—	—57
Delhi	11	—	11	125	+114
TOTAL	723	500	1,223	705	—518
Central Zone :					
Uttar Pradesh	1,110	1,050	2,160	1,610	—550
Madhya Pradesh	506	250	756	430	—326
TOTAL	1,616	1,300	2,916	2,040	—876
Eastern Zone :					
West Bengal	172	20	192	130	—62
Bihar	610	50	660	450	—210
Assam	25	20	45	120	+75
Orissa	290	20	310	75	—235
Tripura	10	—	10	—	—10
Manipur	20	—	20	—	—20
N.E.F.A.	25	—	25	—	—25
Andamans	4	—	4	—	—4
TOTAL	1,156	110	1,266	775	—491
Western Zone :					
Bombay	615	250	865	1,100	+235
Mysore	237	50	287	475	+188
TOTAL	852	300	1,152	1,575	+423
Southern Zone :					
Madras	505	320	825	415	—410
Andhra	505	200	705	450	—255
Kerala	120	20	140	160	+20
Pondicherry	18	—	18	—	—18
TOTAL	1,148	540	1,688	1,025	—663
All States	5,495	2,750	8,245	6,120	—2,125
Centre	495	200	695	—	—695
GRAND TOTAL	5,990	2,950	8,940	6,120	—2,820

- NOTES—1. In the Punjab, Jammu and Kashmir, Himachal Pradesh and Uttar Pradesh degree in agriculture is a preferable qualification for filling a large number of positions in co-operation. In Madras, agricultural graduates are preferred along with commerce and economics graduates for posts in cooperation.
2. In the Punjab, Rajasthan, Himachal Pradesh, Uttar Pradesh and Madhya Pradesh degree in agriculture or experience in revenue is [considered a preferable qualification for filling posts of block development officers.

TABLE 8

ESTIMATED REQUIREMENTS AND OUTTURN OF AGRICULTURAL GRADUATE DURING THE THIRD PLAN.

(1)	Requirements	Outturn on the basis of admission as in 1957		Outturn on the basis of at least 150 admissions per college per annum from 1958 (10% wastage)	Surplus(+) or deficit(—) after expansion (Col. 2 & Col. 4)	Estimated admission per annum to meet the deficit
		20% wastage.	10% wastage.			
(1)	(2)	(3)	(4)	(5)	(6)	(7)
Northern Zone :						
Punjab ..	1,170	580	652	1,210	+40	..
Rajasthan ..	1,140	616	693	1,219	+79	..
Jammu and Kashmir ..	770	..	..	..	-770	..
Himachal Pradesh ..	180	..	..	..	-180	..
Delhi ..	40	..	..	..	-40	..
TOTAL ..	3,300	1,196	1,345	2,429	-871	200
Central Zone :						
Uttar Pradesh ..	4,640	1,616	1,818	4,212	-428	..
Madhya Pradesh ..	2,040	1,036	1,165	2,507	+467	..
TOTAL ..	6,680	2,652	2,983	6,719	+39	..
Eastern Zone :						
West Bengal ..	1,720	160	180	674	-1,046	..
Bihar ..	2,900	680	765	1,350	-1,550	..
Assam ..	800	280	315	598	-202	..
Orissa ..	1,540	120	135	567	-973	..
Tripura ..	80	..	..	..	-80	..
Manipur ..	80	..	..	..	-80	..
N. E. F.A. ..	120	..	..	..	-120	..
Andamans ..	30	..	..	..	-30	..
TOTAL ..	7,270	1,240	1,395	3,189	-4,081	900
Western Zone :						
Bombay ..	3,220	2,484	2,795	3,587	+367	..
Mysore ..	1,350	800	900	1,304	-46	..
TOTAL ...	4,570	3,284	3,695	4,891	+321	..
Southern Zone :						
Madras ..	1,710	648	729	730	-980	..
Andhra ..	2,240	900	1,013	1,350	-890	..
Kerala ..	720	320	360	674	-46	..
Pondicherry ..	10	..	..	..	-10	..
TOTAL ..	4,680	1,868	2,102	2,754	-1,926	500
All States ..	26,500	10,240	11,520	19,982	-6,518	..
Centre ..	1,000	..	..	..	-1,000	..
TOTAL ..	27,500	10,240	11,520	19,982	-7,518	..
				20,000 (rounded)	-7,500 (rounded)	

NOTES—1. Admissions in 1957 for individual colleges are given in Table 1.

2. Figures for Uttar Pradesh include an estimated intake of 200 candidates in Rudrapur University from 1959.

(1)	Agricultural development		Agricultural research		Agricultural education		Total	
	Sanctioned (2)	Filled (3)	Sanctioned (4)	Filled (5)	Sanctioned (6)	Filled (7)	Sanctioned (8)	Filled (9)
Northern Zone :								
Punjab ..	29	26	49	44	45	33	123	103
Rajasthan ..	5	4	41	23	39	28	85	55
Jammu and Kashmir ..	1	1	5	5	..	..	6	6
Himachal Pradesh ..	1	1	9	7	..	..	10	8
Delhi ..	3	1	..	..	..	..	3	1
TOTAL ..	39	33	104	79	84	61	227	173
Central Zone :								
Uttar Pradesh	61	56	148	135	250	244	459	435
Madhya Pradesh	51	50	104	102	84	81	239	233
TOTAL ..	112	106	252	237	334	325	698	668
Eastern Zone :								
West Bengal ..	49	48	104	93	23	22	176	163
Bihar ..	17	14	277	239	70	65	364	318
Assam ..	..	..	1	1	24	20	25	21
Orissa ..	5	5	22	20	25	20	52	45
Tripura ..	3	3	..	..	1	..	4	3
Manipur ..	..	..	..	..	..	..	..	..
N.E.F.A. ..	..	..	..	..	..	..	..	..
Andamans ..	..	..	..	..	..	..	..	..
TOTAL ..	74	70	404	353	143	127	621	550
Western Zone :								
Bombay ..	39	36	76	53	92	76	207	165
Mysore ..	3	3	28	24	18	18	49	45
TOTAL ..	42	39	104	77	110	94	256	210
Southern Zone :								
Madras ..	3	3	55	50	20	20	78	73
Andhra ..	5	5	64	52	40	35	109	92
Kerala ..	2	2	12	6	33	17	47	25
Pondicherry ..	..	..	..	..	..	..	..	..
TOTAL ..	10	10	131	108	93	72	234	190
All States ..	277	258	995	854	764	679	2,036	1,791
Centre ..	..	..	..	..	..	..	704	479
TOTAL ..							2,740	2,270

TABLE 10

ESTIMATED REQUIREMENTS (INCLUDING VACANT POSITIONS) AND EXPECTED OUTTURN OF POST-GRADUATES IN AGRICULTURE FOR THE PERIOD JULY, 1957 TO MARCH, 1961.

(1)	Agricultural development (2)	Agricultural research (3)	Agricultural education (4)	Total (5)	Outturn (6)
<i>Northern Zone :</i>					
Punjab	6	12	41	59	57
Rajasthan	1	35	23	59	..
Jammu and Kashmir	..	5	..	5	..
Himachal Pradesh	4	4	..	8	..
Delhi	3	..	..	3	..
TOTAL	14	56	64	134	57
<i>Central Zone :</i>					
Uttar Pradesh	66	35	50	151	500
Madhya Pradesh	27	17	13	57	80
TOTAL	93	52	63	208	580
<i>Eastern Zone :</i>					
West Bengal	14	49	30	93	20
Bihar	7	51	8	66	..
Assam	..	..	9	9	..
Orissa	..	6	6	12	..
Tripura	..	..	1	1	..
Manipur	..	..	..	..	..
N.E.F.A.	..	..	..	..	..
Andamans	..	..	..	..	..
TOTAL	21	106	54	181	20
<i>Western Zone :</i>					
Bombay	4	71	73	148	250
Mysore	6	6	2	14	25
TOTAL	10	77	75	162	275
<i>Southern Zone :</i>					
Madras	3	7	23	33	30
Andhra	2	7	11	20	20
Kerala	..	8	17	25	..
Pondicherry	..	..	..	..	..
TOTAL	5	22	51	78	50
All States	143	313	307	763	982
Centre	..	..	..	450	..
				1,213	982
				1,200	1,000
				(rounded)	(rounded)

NOTES—1. Requirements of four new post-graduate colleges likely to be started during Second Plan have also been taken into account in "Education" column.

2. Outturn includes those who took the post-graduate degree during May-June, 1957.

TABLE 11

NUMBER OF STUDENTS IN THE FIRST YEAR DURING 1951—57 AND THE NUMBER OF VETERINARY GRADUATES TURNED OUT DURING 1954—57
IN 'VARIOUS VETERINARY COLLEGES.

Name of the College (1)	Capacity (1957-58). (2)	Enrolment in the first year							Graduates turned out			
		51-52 (3)	52-53 (4)	53-54 (5)	54-55 (6)	55-56 (7)	56-57 (8)	57-58 (9)	53-54 (10)	54-55 (11)	55-56 (12)	56-57 (13)
Northern Zone :												
1. Punjab College of Veterinary Science and Animal Husbandry, Hissar.	85	36	43	64	117	100	85	80	38	37	54	36
2. Rajasthan College of Vety. Science and Animal Husbandry, Bikaner	60	..	..	..	40	100	64	65	..	..	..	..
TOTAL ..	145	36	43	64	157	200	149	145	38	37	54	36
Central Zone :												
3. U. P. College of Veterinary Science and Animal Husbandry, Mathura.	100	51	59	97	96	99	98	100	18	25	51	85
4. M. P. Veterinary College, Jabulpur ..	60	60	60	80	81	100	95	100	38	43	48	44
5. College of Veterinary Science and Animal Husbandry, Mhow	80	..	..	..	..	47	84	85	..	..	..	..
TOTAL ..	240	111	119	177	177	246	277	285	56	68	99	129
Eastern Zone :												
6. Bengal Veterinary College, Calcutta ..	60	..	..	60	65	65	62	66	..	..	..	35
7. Bihar Veterinary College, Patna ..	100	81	89	84	189	200	200	100	23	22	39	57
8. Assam Veterinary College, Gauhati ..	90	31	38	45	51	73	79	56	..	1	5	..
9. Orissa College of Veterinary Science and Animal Husbandry, Cuttack	80	..	..	..	..	39	45	40	..	..	..	..
TOTAL ..	330	112	127	189	305	377	386	262	23	23	44	92

Western Zone :

10. Bombay Veterinary College, Bombay	75	51	62	60	65	111	66	65	45	29	32	38
TOTAL ..	75	51	62	60	65	111	66	65	45	29	32	38

Southern Zone :

11. Madras Veterinary College, Madras ..	120	76	80	77	80	100	120	116	68	75	59	43
12. Andhra Veterinary College, Bapatla	80	..	..	..	..	48	66	80	..	..	..	..
13. Animal Husbandry and Veterinary College, Hyderabad.	90	48	48	48	126	117	60	90	26	36	34	30
14. Veterinary College, Trichur ..	80	..	..	..	..	70	80	80	..	..	..	..
TOTAL ..	370	124	128	125	206	335	326	366	94	111	93	73
GRAND TOTAL ..	1,160	434	479	615	910	1,269	1,204	1,123	256	268	322	368

NOTES—1. In case of Assam Veterinary College, those who fail to get veterinary degree are awarded diploma by the State Government in the final year.

- The outturn in 1956-57 from Veterinary Colleges, Patna and Madras does not include those who passed out in the Supplementary Examination during that year.
- Two shifts each with a strength of 100 students had been created during 1954-55, 1955-56 and 1956-57 in Patna Veterinary College to meet the heavy rush for admissions. Similar two shifts were run during 1954-55 and 1955-56 in the Punjab Veterinary College with a strength of 40 students in each year and also in the Veterinary College, Hyderabad with a strength of 78 and 52 students during the two years. A second shift was run during 1955-56 in the Rajasthan Veterinary College and in the Bombay Veterinary College with a strength of 50 and 46 students respectively.

TABLE 12

NUMBER OF SANCTIONED AND FILLED POSITIONS AS ON JUNE, 1957 FOR WHICH VETERINARY GRADUATES ARE REQUIRED

(1)	Development		Research		Education		Total	
	sanc- tioned	filled	sanc- tioned	filled	sanc- tioned	filled	sanc- tioned	Filled
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
<i>Northern Zone :</i>								
Punjab ..	356	268	45	36	39	33	440	337
Rajasthan ..	174	129	..	..	39	20	213	149
J. & K. ..	63	51	..	..	..	..	63	51
H. P. ..	50	17	2	1	..	..	52	18
Delhi ..	15	12	..	..	..	..	15	12
TOTAL ..	658	477	47	37	78	53	783	567
<i>Central Zone :</i>								
U. P. ..	888	695	52	27	57	50	997	772
M. P. ..	366	228	22	22	66	63	454	313
TOTAL ..	1,254	923	74	49	123	113	1,451	1,085
<i>Eastern Zone :</i>								
West Bengal ..	355	266	74	66	44	33	473	365
Bihar ..	388	246	40	13	79	68	507	327
Assam ..	130	130	5	5	19	19	154	154
Orissa ..	163	139	14	5	26	17	203	161
Tripura ..	16	4	..	..	..	..	16	4
Manipur ..	10	10	..	..	..	..	10	10
N.E.F.A. ..	5	5	..	..	..	..	5	5
Andamans ..	7	4	..	..	..	..	7	4
TOTAL ..	1,074	804	133	89	168	137	1,375	1,030
<i>Western Zone :</i>								
Bombay ..	548	517	60	50	43	43	651	610
Mysore ..	61	61	14	14	..	..	75	75
TOTAL ..	609	578	74	64	43	43	726	685
<i>Southern Zone :</i>								
Madras ..	445	325	28	21	77	66	550	412
Andhra ..	480	430	60	45	59	54	599	529
Kerala ..	154	89	4	2	40	18	198	109
Pondicherry ..	11	8	..	..	..	..	11	8
TOTAL ..	1,090	852	92	68	176	138	1,358	1,058
All States ..	4,685	3,634	420	307	588	484	5,693	4,425
Centre ..	..	..	..	..	..	..	210	163
GRAND TOTAL ..	..	..	..	..	..	..	5,903	4,588
							5,900	4,600
							(rounded)	(rounded)

TABLE 13

ESTIMATED REQUIREMENTS AND OUTTURN OF VETERINARY GRADUATES FOR THE PERIOD
JULY, 1957 TO MARCH, 1961 -

	Requirements				Outturn			
	Develop- ment	Research	Educa- tion	Total	Two Years emer- gency diploma holders.	Graduates (at 30% wastage)	Total (col. 6 plus 7)	Deficit— Surplus+
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
<i>Northern Zone :</i>								
Punjab ..	203	9	9	221	60	247	307	+86
Rajasthan ..	127	..	21	148	233	143	376	+228
Jammu & Kash- mir	17	..	..	17	56	..	56	+39
Himachal Pra- desh	47	1	..	48	16	..	16	-32
Delhi ..	5	..	..	5	..	..	..	-3
TOTAL ..	399	10	30	439	365	390	755	+316
<i>Central Zone :</i>								
Uttar Pradesh	655	32	47	734	300	290	590	-144
Madhya Pradesh	370	10	20	400	300	329	629	+229
TOTAL ..	1,025	42	67	1,134	600	619	1,219	+85
<i>Eastern Zone :</i>								
West Bengal ..	453	26	56	535	210	169	379	-156
Bihar ..	557	33	31	621	280	470	750	+129
Assam ..	105	8	6	119	..	142	142	+23
Orissa ..	228	9	33	270	127	59	186	-84
Tripura ..	26	..	..	26	..	..	..	-26
Manipur ..	5	..	..	5	..	..	..	-5
N. E. F. A. ..	5	..	..	5	..	..	..	-5
Andamans ..	6	..	..	6	..	..	..	-6
TOTAL ..	1,385	76	126	1,587	617	840	1,457	-130
<i>Western Zone :</i>								
Bombay ..	191	11	21	223	2	207	209	-14
Mysore ..	192	..	..	192	..	..	..	-192
TOTAL ..	383	11	21	415	2	207	209	-206
<i>Southern Zone :</i>								
Madras ..	389	102	40	531	..	253	253	-278
Andhra ..	430	40	20	490	509	322	831	+341
Kerala ..	240	2	40	282	..	105	105	-177
Pondicherry ..	9	..	..	9	7	..	7	-2
TOTAL ..	1,068	144	100	1,312	516	680	1,196	-116
All States ..	4,260	283	344	4,887	2,100	2,736	4,836	-51
Centre ..	..	..	..	140	..	..	..	-140
Others ..	..	..	..	100	..	..	..	-100
GRAND TOTAL ..				5,127	2,100	2,736	4,836	-291
(Rounded)	..	..	..	5,100	2,100	2,700	4,800	-300

NOTES—1. It is presumed that two years emergency diploma holders will be treated on par with other veterinary graduates.

2. The outturn of veterinary graduates (col. 7) includes those who graduated during the year 1956-57.

TABLE 14

ESTIMATED REQUIREMENT AND OUTTURN OF VETERINARY GRADUATES DURING THE THIRD PLAN

Requirement	Outturn on the basis of admission as in 1957 (Wastage 30%)	Outturn after using the full existing capacity from 1958 (Wastage 10%)	Surplus and deficit after expansion col- (4)—col. (2)	
(1)	(2)	(3)	(4)	
Northern Zone :				
Punjab ..	287	280	366	+79
Rajasthan ..	284	228	283	—1
Jammu & Kashmir ..	183	..	..	—183
Himachal Pradesh ..	43	..	..	—43
Delhi ..	10	..	..	—10
TOTAL	807	508	649	—158
Central Zone :				
Uttar Pradesh..	1,170	560	705	—465
Madhya Pradesh ..	506	648	805	+299
TOTAL	1,676	1,208	1,510	—166
Eastern Zone :				
West Bengal ..	434	231	287	—147
Bihar ..	693	350	435	—258
Assam ..	203	196	366	+163
Orissa ..	388	140	318	—70
Tripura ..	19	..	..	—19
Manipur ..	19	..	..	—19
N.E.F.A. ..	30	..	..	—30
Andamans ..	6	..	..	—6
TOTAL	1,792	917	1,406	—386
Western Zone :				
Bombay ..	808	228	319	—489
Mysore ..	338	280	360	+22
TOTAL	1,146	508	679	—467
Southern Zone :				
Madras ..	430	406	519	+89
Andhra ..	567	595	739	+172
Kerala ..	179	280	348	+169
Pondicherry ..	3	..	..	—3
TOTAL	1,179	1,281	1,606	+427
All States ..	6,600	4,422	5,850	—750
Centre ..	200	..	..	—200
GRAND TOTAL..	6,800	4,422	5,850	—950
(Rounded) ..	6,800	4,400	5,800	—1,000

NOTE:—Figures for Uttar Pradesh and Mysore have been calculated after taking into account the establishment of the Agricultural University, Rudrapura from 1959 and the Veterinary College, Mysore from 1958, each with a capacity of 100 students.

TABLE 15
EXISTING TRAINING FACILITIES FOR DAIRY PERSONNEL

<i>Name of the Institution</i>	<i>Duration of the course (in years)</i>	<i>Admission per year</i>	<i>Expected outturn up to the end of Second Plan</i>
(1)	(2)	(3)	(4)
<i>Post Graduate</i>			
<i>(M. Sc. or Ph. D).</i>			
1. National Dairy Research Institute, Karnal	2	14	28
2. Agra University	2	12	48
<i>(B. Sc.) (Dairying).</i>			
1. National Dairy Research Institute, Karnal	3	20	30
2. Anand Agricultural Institute and College	3	30	50
<i>I. D. D.</i>			
1. National Dairy Research Institute, Bangalore	2	35	120
2. Allahabad Agricultural Institute, Allahabad	2	13	50

NOTES:—

1. Some Universities, such as the University of Punjab, the University of Poona, etc. provide facilities for offering a special paper in dairying in the M. Sc. course (Agri.)
2. The Allahabad Agricultural Institute offers courses in B.Sc. (Agri.) with specialization in animal husbandry and dairying. Admission capacity for such course is for 12 candidates per annum.
3. Post-graduate course in dairying at the National Dairy Research Institute, Karnal is likely to start in 1958. The degree course started in 1957. The admission capacity for the degree course will increase to 60 when the Institute is fully established.
4. For I. D. D. course candidates are admitted after matriculation.
5. Besides the above course, there are a number of refresher courses for junior staff, which are imported at the National Dairy Research Institute, Bangalore, N. D. R. I. Karnal and Military Dairy Farm, Meerut.

TABLE 16
ESTIMATES NUMBER OF DAIRIES AND MILK PRODUCTS FACTORIES
To be set up during the Third Plan

Sl. No.	States			Dairies of different Capacity					Milk Pro- ducts Fac- tories
				150- mds.	250- mds.	500- mds.	1000- mds.	Total	
(1)	(2)			(3)	(4)	(5)	(6)	(7)	(8)
1.	Andhra Pradesh	..	..	3	11	1	..	15	..
2.	Assam	..	..	1	..	..	..	1	..
3.	Bihar	..	..	1	5	..	..	6	1
4.	Bombay	..	..	4	8	..	..	12	1
5.	Kerala	..	..	..	6	..	..	6	..
6.	Madhya Pradesh	..	..	2	6	1	..	9	1
7.	Madras	..	..	4	9	1	1	15	1
8.	Mysore	..	..	3	3	2	1	9	..
9.	Orissa	..	..	2	1	..	..	3	..
10.	Punjab	..	..	5	2	3	..	10	2
11.	Rajasthan	..	..	2	3	2	..	7	1
12.	Uttar Pradesh	..	..	5	10	4	..	19	2
13.	West Bengal	..	..	6	1	1	..	8	..
TOTAL				38	65	15	2	120	9

TABLE 17

REQUIREMENT OF PERSONNEL FOR EACH TYPE OF MILK SUPPLY SCHEME AND FOR A MILK PRODUCTS FACTORY.

<i>Dairy of different Capacity</i>				<i>Milk product factory</i>				
				150mds.	250mds.	500mds.	1000mds.	
				*	*	*	*	10
1. Rural milk organisers :								
2. Milk collection centres :								
(i) Managers	..	..	..	2	3	4	6	3
(ii) Chemists and Bacteriologists	..	..	..	2	3	4	6	6
3. Dairy factories :								
(i) Manager	..	..	..	1	1	1	1	1
(ii) Shift Manager	..	..	..	..	1	2	2	2
(iii) Dairy supervisors	..	..	..	2	2	3	4	10
(iv) Chemists and Bacteriologists	..	..	..	1	1	2	3	6
(v) Dairy Engineers	..	..	..	1	1	1	1	1
(vi) Shift engineers	..	..	..	..	1	2	2	2
(vii) Milk Sales Officers	..	..	..	1	1	1	1	1
(viii) Asstt. Milk Sales Officer..	..	..	..	1	2	3	4	2

*For every 100 villages from where milk will be collected one Rural milk organiser will be required. The number of such organisers required for each type of Dairy will depend upon the quantity of milk that will be available in the villages which will feed the dairy

TABLE 18
ESTIMATED REQUIREMENT OF TECHNICAL PERSONNEL FOR FISHERIES WORK DURING THE THIRD PLAN.

		<i>District Officers</i>	<i>General Officers</i>	<i>Fish Culturists</i>	<i>Fishery Co-operators</i>	<i>Fishery Technologists</i>	<i>Fishery Engineers</i>	<i>Research personnel</i>	<i>Marine Engineers</i>	<i>Master Fisherman</i>
(1)		(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
<i>Northern Zone :</i>										
Punjab ..	..	6	5	5	2	2	1	1	..	..
Rajasthan ..	..	6	5	5	2	..	..	..	..	..
Jammu and Kashmir ..	..	2	2	2	2	2	1	..	..	..
Himachal Pradesh ..	..	2	1	1	1	1	..	..	..	..
TOTAL ..	..	18	13	13	7	5	2	1	..	..
<i>Central Zone :</i>										
Uttar Pradesh ..	..	25	15	12	12	6	4	2	..	..
Madhya Pradesh ..	..	22	12	12	10	4	3	1	..	..
TOTAL ..	..	47	27	24	22	10	7	3	..	..
<i>Eastern Zone :</i>										
W. Bengal ..	..	18	10	12	10	8	4	4	5	5
Bihar ..	..	20	15	12	12	3	3	2	..	..
Assam ..	..	12	7	7	6	2	2	1	..	..
Orissa ..	..	20	10	5	5	4	4	2	2	2
Tripura ..	..	1	1	1	1	1	..	..	..	..
Manipur ..	..	1	1	1	1	1	1	..	..	..
N. E. F. A. ..	..	2	1	1	1	1	..	..	..	..
Andamans ..	..	1	1	1	1	2	1	..	1	1
TOTAL ..	..	75	46	40	37	22	15	9	8	8
<i>Western Zone :</i>										
Bombay ..	..	20	12	8	12	8	4	2	5	5
Mysore ..	..	15	12	7	10	8	4	2	5	5
TOTAL ..	..	35	24	15	22	16	8	4	10	10
<i>Southern Zone:</i>										
Madras ..	..	12	10	5	10	5	4	2	5	5
Andhra Pradesh ..	..	20	15	7	10	5	4	2	2	2
Kerala ..	..	12	8	5	8	8	4	4	5	5
Pondicherry ..	..	1	1	1	1	2	1	..	1	1
Laccadives ..	..	..	1	..	1	1	1	..	1	1
TOTAL ..	..	45	35	18	30	21	14	8	14	14
All States ..	..	220	155	110	118	74	46	25	32	32
Centre ..	..	..	5	10	2	6	4	125	18	18
GRAND TOTAL ..	..	220	160	120	120	80	50	150	50	50

TABLE 19

NUMBER OF POSITIONS FOR FOREST OFFICERS AND RANGERS AVAILABLE AS IN JUNE, 1957 AND TOTAL REQUIREMENTS (INCLUDING VACANT POSITIONS) FOR THE PERIOD JULY, 1957 TO MARCH, 1961 OF FORESTRY PERSONNEL FOR NORMAL WORK AND FORESTRY DEVELOPMENT SCHEMES.

(1)	Santioned positions		Filled positions		Requirement (including vacant positions) for 1957-61	
	Officer (2)	Ranger (3)	Officer (4)	Ranger (5)	Officer (6)	Ranger (7)
Northern Zone :						
Punjab	25	57	19	57	11	12
Rajasthan	28	109	27	109	5	7
Jammu and Kashmir	45	120	42	110	5	20
Himachal Pradesh	29	65	25	62	4	3
Delhi	1	..	1	..	..	..
TOTAL	128	351	114	338	25	42
Central Zone :						
Uttar Pradesh	105	300	102	280	20	46
Madhya Pradesh	151	390	150	380	33	64
TOTAL	256	690	252	660	53	110
Eastern Zone :						
West Bengal	45	130	42	120	5	20
Bihar	47	134	44	122	17	60
Assam	50	125	46	120	6	15
Orissa	56	160	55	157	18	57
Tripura	5	12	4	11	1	10
Manipur	2	5	2	5	..	..
N. E. F. A.	6	20	6	20	..	..
Andamans	6	18	6	18	..	..
TOTAL	217	604	205	573	47	162
Western Zone :						
Bombay	95	372	84	347	30	138
Mysore	65	200	62	200	23	60
TOTAL	160	572	146	547	53	198
Southern Zone :						
Madras	43	129	43	129	..	..
Andhra Pradesh	30	90	27	80	8	20
Kerala	29	76	26	76	7	33
Pondicherry	..	..	..	..	..	..
TOTAL	102	295	96	285	15	53
All States	863	2,512	813	2,403	193	565
Centre	37	..	27	..	13	4

NOTES:—1. The Officers at the Centre are on deputation from States and have been accounted for in the strength of the State cadres. Other officers in the Forest Research Institute numbering 119 are not essentially Forest Officers but Botanists, Entomologists etc. and have not, therefore, been included here.

2. The figure shown against officers includes Chief Conservators of Forest or Heads of Forest Department, Conservators of Forest, Divisional Forest Officers, Assistant Conservators of Forests, Sub-Divisional Officers and Forest Officers in special posts, *e. g.*, working plan officers.

TABLE 20
THIRD FIVE YEAR PLAN FORESTRY
Requirement of Forest Officers

	Square 280,000 miles
Area of Forests	
Approximate No. of divisional charges (1,000 sq. miles per Division).	280
Supervisory charges	50
Extra Territorial senior charges	90
Working Plan Officers 40	
Silviculturists 30	
Special duty 20	
	420
Assistant Conservators	700
	1,120
Leave and training reserve (1/7th)	160
Total Cadre Strength envisaged	1,280
Annual training for replacement to the cadre at the above strength	56
Central Govt. requirements	3
	59
Annual Training for replacements to Central Forest Service and for bringing the cadre to the increased strength	15
Requirements of Soil Conservation	6
	80
<i>Requirement of Sub-professionals, i. e., Rangers</i>	
(1) Territorial (140 sq. miles per range)	2,000
(2) For Working Plans	50
(3) Special duty	300
(4) Silviculture Work	300
TOTAL	2,650
Leave and training reserve (1/7th)	380
Total Cadre Strength	3,030
Annual training (approximately) for replacement to the Cadre at the above strength	130
Central Govt. requirements will be practically negligible	130
Requirements of Soil Conservation	30
	160 (rounded)

TABLE 21

NUMBER OF POSITIONS SANCTIONED AND FILLED AS ON JUNE, 1957, AND THE REQUIREMENT OF PERSONNEL FOR SOIL CONSERVATION FOR THE PERIOD JULY, 1957 TO MARCH, 1961.

				Sanctioned positions	Filled positions	Requirements (in- cluding vacant positions) for 1957-61
(1)				(2)	(3)	(4)
<i>Northern Zone :</i>						
Punjab	..	..	..	6	6	10
Rajasthan	..	..	..	15	2	13
Jammu and Kashmir	..	..	..	12	10	12
Himachal Pradesh	..	..	..	3	1	8
Delhi	..	..	..	..	..	..
TOTAL				36	19	43
<i>Central Zone :</i>						
Uttar Pradesh	..	..	..	50	40	111
Madhya Pradesh	..	..	..	9	9	26
TOTAL				59	49	137
<i>Eastern Zone :</i>						
West Bengal	..	..	..	6	6	12
Bihar	..	..	..	40	30	61
Assam	..	..	..	15	15	10
Orissa	..	..	..	15	10	15
Tripura	..	..	..	..	..	..
Manipur	..	..	..	..	..	..
N. E. F. A.	..	..	..	1	..	1
TOTAL				77	61	99
<i>Western Zone :</i>						
Bombay	..	..	..	151	142	381
Mysore	..	..	..	65	60	32
TOTAL				216	202	413
<i>Southern Zone :</i>						
Madras	..	..	..	26	26	123
Andhra Pradesh	..	..	..	56	22	285
Kerala	..	..	..	3	11	7
Pondicherry	..	..	..	..	..	..
TOTAL				85	59	415
All States	..	..	..	473	380	1,107
Centre	..	..	..	90	68	110
GRAND TOTAL				563	448	1,217

NOTE:—The figures in the above table refer to the number of positions requiring degree qualifications or above.

TABLE 22

ESTIMATED REQUIREMENT OF PERSONNEL FOR SOIL CONSERVATION DURING THE THIRD PLAN

(1)				Officers (2)	Assistants (3)	Total (4)
<i>Northern Zone :</i>						
Punjab	..	..	..	15	75	90
Rajasthan	..	..	..	10	50	60
Jammu and Kashmir	..	..	..	7	35	42
Himachal Pradesh	..	..	..	2	10	12
Delhi	..	..	..	..	1	1
TOTAL				34	171	205
<i>Central Zone :</i>						
Uttar Pradesh	..	..	..	45	225	270
Madhya Pradesh	..	..	..	55	275	330
TOTAL				100	500	600
<i>Eastern Zone :</i>						
West Bengal	..	..	..	17	85	102
Bihar	..	..	..	13	65	78
Assam	..	..	..	2	10	12
Orissa	..	..	..	2	10	12
Tripura	..	..	..	..	1	1
Manipur	..	..	..	..	1	1
N. E. F. A.	..	..	..	1	2	3
Andamans and Nicobar	..	..	..	..	1	1
TOTAL				35	175	210
<i>Western Zone :</i>						
Bombay	..	..	..	95	475	570
Mysore	..	..	..	30	150	180
TOTAL				125	625	750
<i>Southern Zone :</i>						
Madras	..	..	..	20	100	120
Andhra Pradesh	..	..	..	20	100	120
Kerala	..	..	..	6	30	36
				46	230	276
All States	..	..	..	340	1,701	2,041
Centre	..	..	..	10	50	60
GRAND TOTAL				350	1,750 (rounded)	2,100 (rounded)

TABLE 23

NUMBER OF POSITIONS AVAILABLE AS ON JUNE, 1957 AND TOTAL REQUIREMENTS (INCLUDING VACANT POSITION) FOR THE PERIOD JULY, 1957 TO MARCH 1961 OF GRADUATE PERSONNEL IN AGRICULTURAL MARKETING.

				Sanctioned positions	Positions filled	Requirements for 1957-61 (in- cluding vacant positions)
(1)				(2)	(3)	(4)
<i>Northern Zone :</i>						
Punjab	..	..	..	15	14	20
Rajasthan	..	..	..	23	12	11
Jammu and Kashmir	..	..	..	..	..	..
Himachal Pradesh	..	..	..	6	5	1
Delhi	..	..	..	2	2	..
TOTAL				46	33	32
<i>Central Zone :</i>						
Uttar Pradesh	..	..	..	2	2	18
Madhya Pradesh	..	..	..	3	3	40
TOTAL				5	5	58
<i>Eastern Zone :</i>						
West Bengal	..	..	..	81	80	4
Bihar	..	..	..	27	25	2
Assam	..	..	..	3	3	5
Orissa	..	..	..	5	4	2
Tripura	..	..	..	1	1	..
Manipur	..	..	..	..	..	..
N. E. F. A.	..	..	..	..	..	..
Andamans	..	..	..	..	..	..
TOTAL				117	113	13
<i>Western Zone :</i>						
Bombay	..	..	..	42	40	17
Mysore	..	..	..	15	12	7
TOTAL				57	52	24
<i>Southern Zone :</i>						
Madras	..	..	..	15	15	4
Andhra	..	..	..	11	4	15
Kerala	..	..	..	2	2	..
Pondicherry	..	..	..	..	..	..
TOTAL				28	21	19
All States	..	..	..	253	224	46
Centre	..	..	..	110	105	93
GRAND TOTAL	..	..	..	363	329	439
(rounded)	..	..	..	360	330	440

NOTES:—1. Agricultural Marketing Department in Uttar Pradesh is a part of the Civil Supplies Department. The staff of that Department also looks after agricultural marketing work.

2. Some of the staff in West Bengal are looking after the cooperative marketing and warehousing.

TABLE 24

ESTIMATED REQUIREMENTS OF GRADUATE TECHNICAL PERSONNEL FOR AGRICULTURAL MARKETING WORK IN THE THIRD PLAN.

(1)	Total require- ment up to the end of Third Plan	Likely to be avail- able at begin- ning of Third Plan	Additional re- quirement during the Third Plan
(1)	(2)	(3)	(4)
Northern Zone :			
Punjab	66	34	32
Rajasthan	81	23	58
Jammu and Kashmir	..	..	..
Himachal Pradesh	15	6	9
Delhi	3	2	1
TOTAL ..	165	65	100
Central Zone :			
Uttar Pradesh	159	20	139
Madhya Pradesh	96	43	53
TOTAL ..	255	63	192
Eastern Zone :			
West Bengal	74	84	2
Bihar	54	27	27
Assam	38	8	30
Orissa	81	6	75
Tripura	3	1	2
Manipur	3	..	3
N. E. F. A.	..	..	..
TOTAL ..	253	126	139
Western Zone :			
Bombay	134	57	77
Mysore	60	19	41
TOTAL ..	194	76	118
Southern Zone :			
Madras	37	19	18
Andhra	64	21	43
Kerala	22	2	20
TOTAL ..	123	42	81
All States	990	372	630
Centre	470	398	72
TOTAL STATES AND CENTRE ..	1,460	770	702 (rounded)

TABLE 25

NUMBER OF POSITIONS IN THE STATE DEPARTMENTS OF CO-OPERATION AVAILABLE FOR SENIOR AND INTERMEDIATE PERSONNEL IN CO-OPERATION AS ON JUNE, 1957 AND THE ESTIMATED REQUIREMENTS DURING JULY, 1957 TO MARCH, 1961.

(1)	Sanctioned positions	Filled positions	Total requirements including vacant positions during 1957—61. (4)
<i>Northern Zone :</i>			
Punjab	339	261	234
Rajasthan	224	171	239
Jammu and Kashmir	59	12	61
Madhya Pradesh	86	84	19
Delhi	23	20	5
TOTAL ..	731	540	558
<i>Central Zone :</i>			
Uttar Pradesh	528	513	570
Madhya Pradesh	350	320	400
TOTAL	878	833	970
<i>Eastern Zone:</i>			
West Bengal	350	320	250
Bihar	719	577	845
Assam	204	182	222
Orissa	14	654	149
Tripura	688	14	10
Manipur	20	15	10
N. E. F. A.	20	15	10
Andamans	2	2	3
TOTAL	2,017	1,779	1,499
<i>Western Zone :</i>			
Bombay	355	276	816
Mysore	456	401	224
TOTAL	811	677	1,040
<i>Southern Zone :</i>			
Madras	706	683	452
Andhra	876	871	1,019
Kerala	332	253	256
Pondicherry	13	13	17
TOTAL	1,927	1,820	1,744
All States	6,364	5,657	5,811
(Rounded)	6,400	5,700	5,800

NOTES—

1. The number of sanctioned positions in Orissa includes 536 Inspectors for whom minimum qualification prescribed is Intermediate.
2. Of the 5,800 personnel required about 300 will be senior personnel. 5,500 will be Intermediate personnel.
3. The Intermediate personnel in the states of Madras and Andhra numbering about 1,500 is being trained in the states' schools.
4. The number intermediate personnel of the State Departments who will be required to be trained at the Regional Training Centres and Block Level Co-operative Training Centres between July, 1957 and March, 1961, will thus be about 4,000.

TABLE 26

PERSONNEL REQUIREMENTS OF THE CO-OPERATIVE DEVELOPMENT SCHEME DURING THE THIRD FIVE YEAR PLAN.

<i>Particulars</i>	<i>Number of societies to be organized during Third Plan</i>	<i>Senior personnel</i>	<i>Intermediate personnel</i>	<i>Junior personnel</i>
(1)	(2)	(3)	(4)	(5)
I Large-Sized Credit Societies:				
1. Managers for 10,000 large-sized societies to be organized during the Third Five Year Plan ..	10,000	..	..	10,000
2. Accountants, etc., additional staff requirements of large-sized societies organized during the Second Five Year Plan ..	..	..	..	5,000
3. Supervisors for 10,000 large-sized societies in the Third Plan ..	..	..	..	700
4. Auditors for 10,000 large-sized societies in the Third Plan. ..	..	..	400	..
II. Small-sized Credit Societies :				
1. Supervisors for small-sized societies ..	..	..	..	1,000
III. Central Co-operative Banks :				
1. Additional staff in view of expansion of business in 300 existing Central Banks ..	..	600	..	400
IV. Apex Banks :				
1. Additional staff to be appointed in view of expansion of business in the existing Land Mortgage Banks ..	..	50	50	..
V. Land Mortgage Banks :				
1. Staff required for strengthening the existing Land Mortgage Banks and new Land Mortgage Banks to be organized during the Third Five Year Plan ..	..	25	575	..
VI. Marketing Societies				
1. Additional staff required by the 1,900 marketing societies organized in the Second Plan owing to increase in business. ..	..	..	1,000	2,000
2. Staff required for the new marketing-cum-processing societies to be organised during the Third Plan ..	600	..	600	2,400
3. Supervisors for marketing societies ..	..	..	250	..

TABLE 26—contd.

(1)	(2)	(3)	(4)	(5)
VII. Co-operative Farming Societies :				
1. Managers of co-operative farming societies to be organized during the Third Plan ..	10,000	..	2,000	3,000
2. Supervisors for co-operative farming societies ..	..	..	500	500
3. Auditors for co-operative farming societies ..	..	..	500	..
VIII. State Department Staff:				
1. Gazetted Officers	..	300	..	..
2. Non-gazetted staff	..	..	500	500
3. Auditors for all types of societies ..	..	..	1,000	..
TOTAL ..	..	975	7,375	30,500

TABLE 27

ESTIMATED REQUIREMENT OF PERSONNEL IN CO-OPERATIVE DEVELOPMENT SCHEMES DURING THE THIRD PLAN.

(1)	Senior personnel (2)	Intermediate personnel (3)	Junior Personnel (4)
<i>Northern Zone :</i>			
Punjab	45	320	1,330
Rajasthan	40	320	1,315
Jammu and Kashmir	25	205	850
Himachal Pradesh	5	50	200
Delhi	2	10	45
TOTAL ..	117	905	3,740
<i>Central Zone :</i>			
Uttar Pradesh	175	1,310	5,395
Madhya Pradesh	75	565	2,340
TOTAL ..	250	1,875	7,735
<i>Eastern Zone :</i>			
West Bengal	65	485	2,005
Bihar	103	775	3,210
Assam	30	225	935
Orissa	55	435	1,795
Tripura	3	20	85
Manipur	3	20	95
N. E. F. A.	4	35	140
Andamans	1	5	30
TOTAL ..	264	2,000	8,295
<i>Western Zone :</i>			
Bombay	120	900	3,730
Mysore	50	380	1,560
TOTAL ..	170	1,280	5,290

TABLE 27—*contd.*

(1)				(2)	(3)	(4)
<i>Southern Zone :</i>						
Madras	..	..	..	64	480	1,985
Andhra	..	..	..	84	630	2,615
Kerala	..	..	..	25	200	830
Pondicherry	..	..	..	1	5	10
		TOTAL	..	174	1,315	5,440
All States	..	..	..	975	7,375	30,500
Centre	..	..	..	25	125	..
		GRAND TOTAL	..	1,000	7,500	30,500

TABLE 28

ESTIMATED REQUIREMENTS OF AGRICULTURAL STATISTICIANS DURING THE SECOND AND THIRD FIVE YEAR
PLAN PERIODS

Type of organization			No. of Organiza- tions	Average pattern of statisti- cal staff	Total statistical staff		Computors
					Research sta- tisticlans/senior teaching staff (4)	Statistical Asstt. U. G. lecturers/ demonstrators (5)	
(1)			(2)	(3)			(6)
<i>Resesrch Institutes (existing) :</i>							
Central Research Institutes	..		13	Res. Statisticians .. 2	54	54	108
Principal State Research Stations	..		6	Statistical Asstt. .. 2			
Commodity Committees ..	..		8	Computors .. 4			
<i>Research Institutes (proposed) :</i>							
Cross Commodity Research Stations			17	Res. Statisticians .. 2	106	106	212
Agro-economic Research Stations	..		14	Statistical Asstt. .. 2			
Livestock Research Stations	..		14	Computors ... 4			
Horticulture Research Stations	..		8				
<i>State Departments of Agriculture, etc.</i>							
	..		15	States Res. Statisticians 4	60	90	180
				Statistical Asstt. .. 6			
				Computors (per State) .. 12			
<i>Post-graduate Colleges :</i>							
Agriculture ..	..		14	Senior staff .. 3	57	57	57
Animal Husbandry	..		5	Demonstrators .. 3			
				Computors .. 3			

Under-graduate Colleges :

Agriculture	..	..	..	21	}	Lecturer	..	1	..	32
Animal Husbandry	..	..	..	11						

Economics Research Centres :

Agro-Economic Centres	..	..	8	}	Res. Statistician	..	1	22	..	..
Farm Management Centres	..	..	14		TOTAL	..	..	299	339	557

TABLE 29
ESTIMATED REQUIREMENT OF GRADUATE PERSONNEL IN PLANT PROTECTION DURING THE THIRD PLAN

(1)	Organisation		Extension		Total (6)
	Scientific Officers (2)	Assistants (3)	Extension specialists at district level (4)	Extension Officers at Block level (5)	
Northern Zone :					
Punjab	3	13	21	228	265
Rajasthan	4	16	26	225	271
Jammu and Kashmir	3	9	13	145	170
Himachal Pradesh	1	3	4	34	42
Delhi	1	2	1	8	12
TOTAL ..	12	43	65	640	760
Central Zone :					
Uttar P radesh	7	27	51	920	1,005
Madhya Pradesh	5	22	40	400	467
TOTAL ..	12	49	91	1,320	1,472
Eastern Zone :					
West Bengal	3	11	16	340	370
Bihar	..	12	17	549	578
Assam	3	9	12	160	184
Orissa	2	10	13	305	330
Tripura	..	2	1	15	18
Manipur	1	2	1	16	20
N. E. F. A.	..	2	1	24	27
Andamans	1	2	1	5	9
TOTAL ..	10	50	62	1,414	1,536
Western Zone :					
Bombay	3	23	43	634	703
Mysore	2	12	19	267	300
TOTAL ..	5	35	62	901	1,003
Southern Zone :					
Madras	3	9	12	340	364
Andhra	3	13	20	441	477
Kerala	2	6	7	142	157
Pondicherry	1	2	1	2	6
TOTAL ..	9	30	40	925	1,004
All States	48	207	320	5,200	5,775
Centre	6	32	..	..	38
GRAND TOTAL ..	54	239	320	5,200 (5,800 rounded)	5,813

NOTES—1. Requirements of organisation are for direction and coordination at headquarters and at regional level.

2. Scientific officers include officers in class I and Class II posts at regional level.

3. Scientific officers and extension specialists should have a post-graduate degree in science or in agriculture .

4. Assistants and Extension Officers should have a degree in science or in agriculture.

APPENDIX I
GOVERNMENT OF INDIA
PLANNING COMMISSION

Resolution

COMMITTEE ON AGRICULTURAL PERSONNEL

New Delhi, the 18th March, 1957.

No. PC(IV)5(II)4/57.—During the First Five Year Plan, with the organisation of national extension and community projects and development of new programmes in agriculture and allied fields, the requirements of trained personnel increased rapidly and shortage were experienced in several directions. In 1954-55 and 1955-56 by way of preparation for the Second Five Year Plan, steps were taken to expand training facilities in agriculture and animal husbandry. The provisional targets of agricultural production proposed for the period of the Second Plan have been recently revised in consultation with States. It is considered that in view of these targets and the programmes being undertaken through national extension and community projects, the demands for trained personnel, both in numbers and in quality, are likely to be larger and to increase more rapidly than was anticipated three years ago. Moreover, it is essential to institute early enough arrangements for training personnel of different grades in sufficient numbers, having regard to the probable requirements for the Third Five Year Plan as well as long-term proposals for development in agricultural and other fields which are presently under examination. Accordingly the Planning Commission (Government of India) have decided to constitute a Committee on Agricultural Personnel.

2. The Committee will consist of—

Chairman

- (1) Shri P. N. Thapar, I.C.S.,
Secretary, Ministry of Agriculture,
Government of India,
New Delhi.

Members

- (2) Shri B. R. Tandan, I.C.S.,
Secretary, Ministry of Community Development,
Government of India,
New Delhi.
- (3) Sardar Nawab Singh, I.C.S.,
Advisor, Programme Administration,
Planning Commission,
New Delhi.
- (4) Dr. M. S. Randhawa, I.C.S.,
Vice-President,
Indian Council of Agricultural Research,
New Delhi.
- (5) Shri L. P. Singh, I.C.S.,
Directorate of Manpower,
Ministry of Home Affairs,
New Delhi.

- (6) Shri G. G. Takle, I.F.S.,
Inspector General, Forests,
Ministry of Agriculture.
 - (7) Dr. B. N. Uppal,
Agricultural Commissioner,
New Delhi.
 - (8) Dr. L. Sahay,
Animal Husbandry Commissioner,
New Delhi.
 - (9) Dr. L. C. Sikka,
Dairy Development Adviser,
New Delhi.
 - (10) Dr. J. S. Patel,
Agricultural Adviser,
Ministry of Community Development,
New Delhi.
 - (11) Shri Pitambar Pant,
Scientific and Technical Manpower
Division, Planning Commission,
New Delhi.
- Member-Secretary*
- (12) Shri J. V. A. Nehemiah,
Secretary,
Indian Council of Agricultural Research,
New Delhi.

3. The terms of reference of the Committee on Agricultural Personnel will be :—

- (1) to examine the present position in regard to the supply of trained technical, scientific and administrative personnel, with special reference to existing or expected shortage;
- (2) to make a fresh assessment of requirements for trained personnel during the Second and the Third Five Year Plans, keeping in view the increased targets of agricultural production and the long-term proposals of development in different fields;
- (3) to review the present programmes for the expansion of training facilities and the progress made in their implementation;
- (4) to recommend measures for augmenting training facilities and to formulate a phased programme for giving effect to them; and
- (5) to make such other proposals as may be considered necessary.

The Committee will consider the various aspects of the problem in relation to all grades of personnel required for programmes of Development, Extension, Research and Education in the fields of Agriculture (including Agricultural Engineering and Horticulture), Soil Conservation, Animal Husbandry and Dairying, Fisheries, Poultry and Forests as well as in respect of Village Level Workers. In making its proposals for developing training facilities the Committee will consider the forms of training, including basic training for each grade of personnel, in-service, post-graduate and specialised training and refresher courses.

4. The Committee may co-opt additional members according to requirements.

5. The Committee is expected to report by the end of 1957. It may submit interim proposals for implementation with effect from 1958-59.

6. The headquarters of the Committee will be located in New Delhi.

(Sd.) Y. N. SUKTHANKAR,
SECRETARY, PLANNING COMMISSION.

ORDER

Ordered that a copy of this Resolution be published in the *Gazette of India* and communicated to all concerned.

(Sd.) Y. N. SUKTHANKER,
SECRETARY, PLANNING COMMISSION

APPENDIX I-A

D.O. No. 10(1)/57-Edn. III

MINISTRY OF FOOD AND AGRICULTURE,

DEPARTMENT OF AGRICULTURE (I.C.A.R.)

Dated, New Delhi, the 23rd July, 1957.

SHRI P. N. THAPAR, I.C.S.,

SECRETARY TO THE GOVERNMENT OF INDIA.

My dear,

As you may be aware, the Planning Commission has recently set up the Agricultural Personnel Committee to make a fresh assessment of the demand and supply position of personnel in Agriculture, Animal Husbandry and allied fields. I enclose for your information a copy of the Resolution which gives the composition and terms of reference of the Committee. As you would notice, the Committee may have to submit interim proposals within the next few months and the final report by the end of the year.

2. The Committee has to collect and process a mass of data in the short time available and to accomplish this, we need your active co-operation and assistance. We have some incomplete data with us. But due to the revision of the targets of production the Agricultural plans of many States may have undergone changes in scope and phasing. This has made it very essential for us to collect some fresh data on manpower requirements and availabilities. I enclose two forms (A.P.1, A.P.2) which cover the information now required by the Committee. You will observe that Form 1 calls for information on existing posts requiring technical qualifications in the agricultural and allied fields specified in the instructions for filling the Form. The second form pertains to similar information on additional staff requirements during the Current Plan. Detailed instructions for filling the Forms are also attached. I shall be grateful if these could be completed and returned by the 15th of August, 1957. All correspondence relating to this may be addressed to Shri J. V. A. Nehemiah, Secretary, Indian Council of Agricultural Research (Tel. No. 42977) who is also Member-Secretary of the Committee.

3. Most of the information required will be already available with the respective Departments in some form or other, and it should not be difficult for your Officers to supply it in the form in which it is now needed by the Committee. In view of the importance attached to the supply of trained personnel to meet Plan requirements it will be greatly appreciated if you suggest to your Officers to give priority to the compilation of this data and send it to the Committee by the required date. I would also request you to let me know the name and address of the Officer in your State/Department who will be handling this work so that Shri Nehemiah can get in touch with him, if necessary.

Yours sincerely,
(Sd.) P. N. THAPAR

Instructions for Filing Form A.P. 1

1. The proforma should be completed and sent in duplicate.

2. The information should be supplied for all posts (of any grade) requiring technical qualifications in one or other of the following subjects of specialisation. Purely administrative posts and categories like truck drivers; tractor drivers and ministerial staff should be excluded.

I—Agriculture—Which will have the following sub-divisions :

- (i) Agricultural Engineering
- (ii) Agronomy
- (iii) Botany including Plant Breeding
- (iv) Chemistry and Soil Science
- (v) Entomology
- (vi) Mycology
- (vii) Horticulture
- (viii) Agriculture economics and Farm Management
- (ix) Animal Husbandry and Dairying (in the agricultural sector).

II—Animal Husbandry and Veterinary

III—Dairying

IV—Fisheries

V—Forestry

VI—Soil Conservation

VII—Co-operation

VIII—Agriculture Marketing

IX—Agriculture Statistics

The titles given are by no means exhaustive and may be supplemented where necessary.

3. Existing posts' means posts already sanctioned and filled in the normal cadre and under various schemes of the State Plan etc., and Posts already sanctioned but not yet filled for various reasons. Posts not yet sanctioned but the creation of which is under consideration should not be shown in form A.P. 1 but shown as additional requirements in form A.P. 2.

4. Form A.P. 1 should show all posts under the control of the State Government/Institution, posts sanctioned under schemes in the States sponsored by I.C.A.R., Commodity Committees etc., for which recruitment is made by the State although funds may be provided partly or wholly by other agencies.

5. A list of institutions, projects, schemes etc., in respect of which information is supplied may be attached.

6. A copy of form A.P. 1 has been filled and sent (along with blank forms) in order to indicate the type of information required by the Committee.

FORM A. P. I.

AGRICULTURAL PERSONNEL COMMITTEE

Particulars of existing Posts

Name of State/Non-Government Institution—

Date of Report—

<i>Name of Institution or Project</i>	<i>Designation of Post</i>	<i>No. of Posts</i>	<i>Whether filled or unfilled</i>	<i>Temporary or Perma- nent</i>	<i>Scale of Pay</i>	<i>Class</i>	<i>Qualifica- tions prescribed</i>	<i>REMARKS</i>
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)

Instructions for filling Form A.P.2

1. The proforma should be completed and sent in *duplicate*.
2. The information should be supplied for all posts (of any grade) requiring technical qualifications in one or other of the following subjects of specialisation.

I—Agriculture—Which will have the following sub-divisions :

- (i) Agricultural Engineering
- (ii) Agronomy
- (iii) Botany including Plant Breeding
- (iv) Chemistry and Soil Science
- (v) Entomology
- (vi) Mycology
- (vii) Horticulture
- (viii) Agriculture Economics and Farm Management
- (ix) Animal Husbandry and Dairying (on the agricultural sector)

II—Animal Husbandry and Veterinary

III—Dairying

IV—Fisheries

V—Forestry

VI—Soil-Conservation

VII—Co-operation

VIII—Agriculture Marketing

IX—Agriculture Statistics

The titles given are by no means exhaustive and may be supplemented where necessary.

3. Figures regarding future man power requirements for normal replacements and for each development project should be entered. Against each year only the additional requirements over and above the previous year should be stated.

4. If figures are not available year by year total number required during the period of the Second Plan may be given.

5. Similarly, if figures cannot be given for sub-divisions of each subject, then total figures may be given for more than one sub-division to be bracketed in the form.

6. An indication of personnel surplus to requirements in various categories or which might become surplus from year to year should also be given. Where a serious shortage is being experienced a brief note giving suggestions for increasing the output to meet the shortage may be attached.

7. Posts of similar designation such as Professors, Lecturers etc., but in different subjects (e.g. Professors of Agronomy, Professor of Chemistry etc.,) should be separately listed.

8. A list of Institutions, projects, schemes etc., in respect of which information is supplied may be attached. If spare copies of original schemes are available, these may also be sent. Otherwise extracts from such projects/schemes indicating the basis and yardsticks adopted for the additional staff may kindly be forwarded. This is very essential.

9. A copy of form A.P. 2 has been filled and sent with blank forms in order to indicate the type of information required by the Committee. Figures given in the completed proforma are only illustrative and not actuals.

AGRICULTURAL PERSONNEL COMMITTEE

Additional requirements year-wise in the Second Five Year Plan

Name of State/Non-Government Institution—

Date of Report—

<i>Name of Institution/ Project</i>	<i>Designation of Post</i>	<i>No. of Posts</i>				<i>Scale of Pay</i>	<i>Class</i>	<i>Qualifications required</i>	<i>How the requirements in Col. 3—6 have been worked out</i>	<i>How the parts are proposed to be filled (indicate sources)</i>
		1957-58	1958-59	1959-60	1960-61					
(1)	(2)	(3)				(4)	(5)	(6)	(7)	(8)

APPENDIX II

A NOTE ON THE ORGANISATION OF EDUCATION, RESEARCH AND EXTENSION (ADVISORY WORK) IN AGRICULTURE, IN CHINA, DENMARK, JAPAN, NETHERLANDS AND UNITED KINGDOM.

There are agricultural advisory (Extension) services in most countries, though they differ greatly in organisation, scope, personnel, administration and efficiency. The present organisation in each country has been influenced largely by its historical background, and the social and economic conditions of the people. There are two contrasting systems of organisation; those directed and administered by Governments and those directed and administered by farm organisations and associations. Examples of the purely Governmental type of organisation are to be found in the Netherlands, and the United Kingdom, while the second type of organisation has been most fully developed in Denmark. There are, moreover, intermediate variations between the two types, and in no two countries are the organisations exactly comparable.

2. While the scope of advisory work is almost the same in all countries and covers a very wide field, there are differences in the approach. In Japan and Netherlands, for instance, the approach of the advisory services is largely directed to individual farmer; in China, on the other hand, the approach is largely through the co-operative farms whose directors and vice-directors, along with the members of the Communist Party working in the villages, function as general purpose extension workers at the village level.

3. As agricultural education becomes more widespread among the farm population, and farming becomes more intensive, the demand on the advisory services increases correspondingly. In the Netherlands, for instance, where agricultural education of the farm population is very widespread the Extension adviser is unable to cope with the demand for advice although he has a jurisdiction of only about 400 farms, with the result that farmers' associations have found it necessary to appoint advisers and meet a portion of their costs.

4. A description of the organisation for advisory work (Extension) along with that for education and research in agriculture, obtaining in China, Denmark, Japan, Netherlands and the United Kingdom, is given in the accompanying pages.

(i) AGRICULTURAL EXTENSION IN CHINA

{This Note on Agricultural Extension in China is an extract from Chapter IX: Measures for Implementation—Technical Reforms (pp. 140-146) of the Report of the Indian Delegation to China on Agricultural Planning and Techniques which visited China in July-August, 1956]

1. *Role of technical reforms.*—While both agrarian re-organisation and economic measures were necessary for the creation of condition conducive to the development of Chinese agriculture, in the last analysis actual increase in production could be brought about mainly by technical reforms. Land reforms and co-operation were useful because they created conditions under which farmers could have the will and the ability to adopt improved techniques. Agricultural finance was necessary because otherwise it would be beyond the means of many farmers to adopt improved techniques. Price,

planned purchase and tax policies were important because adequate incentives and disincentives were needed to induce the farmers to utilize improved techniques of production in the desired manner and for the production of desired crops. Technical reforms must be, therefore, regarded as a very important feature of China's agricultural development.

2. *Types of technical reform*—By technical reforms, the Chinese authorities mean not merely mechanisation and the adoption of modern techniques but also popularisation of old techniques which have been traditional in some areas or with some groups of farmers but have not been popular in other areas. The technical reforms which they are emphasising at present are mostly the wellknown methods of intensive cultivation. These methods are: (i) more intensive use of manures and fertilizer, (ii) soil improvement, (iii) use of better seeds, (iv) extension of multiple cropping areas, (v) planting more high yielding crops, (vi) improving farming methods, (vii) wiping out insects, pests and plant diseases, (viii) use of improved farm tools and gradual introduction of mechanised farming, (ix) water conservancy projects and water and soil conservation, and (x) opening up virgin and idle lands and extending cultivable lands. These measures are being popularized and implemented through special campaigns undertaken by the members of the Communist Party, organising co-operative farm workers into brigades and work teams with view to mobilising the labour in the most effective manner, organising exhibitions, conferences and visits to model farms with a view to exchanging experiences of good cultivation, bringing out a large number of publications and posters describing the experiences of the good farms and the results of scientific research and imparting technical knowledge through a special organisation, namely, the Technique Popularisation Stations.

3. *General purpose extension*—There is no technical measure in the field of agriculture practised in China which is really new. But it is the manner in which these technical measures are being implemented which is remarkable. In Community Project areas in India, we have village level workers who are general purpose men and whose job is to enthuse villagers and to act as the channel through which information about improved techniques can be passed on from research workers to actual tillers of the soil. In China, it is the directors and vice-directors of the co-operative farms and the members of the Communist Party working in villages who function as general purpose workers at the village level. They may not be themselves technical experts but they devote their full energy in enthusing the farmers to use improved methods and transmitting the information about improved techniques from scientists at higher levels to actual tillers of the soil. Unlike in India, these workers at the village level are generally paid by the co-operative farms on the basis of working points like any other member except where they have other sources of income. This means that China has been able to have a very large general purpose extension agency at a much smaller cost to the State than we have been able to have in India.

4. *Technique Popularisation Stations*—For agricultural extension work, however, there is a specialised technical organisation in rural areas of China called Agricultural Technique Popularisation Stations maintained by the Provincial Departments of Agriculture.

5.1 *Intensiveness aimed at these stations* varies considerably in size as also in character from one part of the country to another. In a big suburban area, e.g., in Canton, the station may be quite a big one and may have as many as 30 to 40 technical personnel and may cover about 60 to 70

hsiangs. In a rural area, e.g., Shensi, each Technique Popularisation Station may have only 4 to 8 technical people and may cover 2 to 3 hsiangs. All the workers in these stations are full time employees and are paid by the State. Today in China there are over 10 thousand Technique Popularisation Stations and this means that, on an average, there is one Technique Popularisation Station for 20 hsiangs. The Chinese authorities are, however, rapidly multiplying the number of these stations. Naturally the greatest progress has been made so far in an old liberated area like the Shensi province while more recently liberated area like Kwantung province is relatively thinly covered. The objective seems to be to multiply these stations until the whole country is covered as intensively as the Shensi province is today.

6. *Rapid expansion of TP Stations*—The rate of increase in the number of the Technique Popularisation Stations is also remarkable. There were only 3,500 stations in 1954, the number rose to 8,000 in 1955, to 10,000 by the summer of 1956 and it is proposed to increase it to 16,000 next year.

5.2 It may be, therefore, useful to note here that the Shensi province has a rural population of 15 million and total cultivated area of 11.3 million acres (as compared to a rural population of 10 million and cultivated area of 13.9 million acres in the Punjab). This is a mainly wheat and millet growing area, the total acreage under wheat being about 6 million acres. In this province, there are 1,069 hsiangs each having between 500 to 1,000 families. There are altogether 581 Technique Popularisation Stations each having a staff of 4 to 8 agricultural specialists. This means that there is on average one Technique Popularisation Station for about 2 hsiangs. Besides these 581 Technique Popularisation Stations, there are 100 veterinary stations, 14 machine tractor stations, 84 State farms, 6 secondary agricultural schools and 4 agricultural experimentation stations in the province. The total staff of the Agriculture Department of the province is 9,788 at different levels. This shows the degree of intensity with which the Chinese authorities are trying to cover their country-side with agricultural personnel.

7. *Staff and activity*—These stations are staffed by agricultural and animal husbandry experts and some of the more important stations have specialists in charge of different kinds of farming activities, such as, cropping, seed selection, care of livestock, use of farm tools and machinery, etc.

(1) The Figures as given appear inconsistent. If the largest hsiang has 1,000 families (5,000-6,000 persons), the 1,069 hsiangs of Shensi should account for not more than 6 million population as against 15 million rural population of Shensi. The average hsiang in Shensi has perhaps 2,000-2,500 families.

A recent publication of the Peoples Republic of China (HAND BOOK OF PEOPLES CHINA, April, 1957) explains the latest situation regarding hsiangs, following the nation-wide re division of hsiangs which has reduced their number from about 190,000 before 1956 to 110,000 now :

Hsiang is the lowest administrative unit in rural areas under the direct jurisdiction of the county. It is composed of a number of villages whose inhabitants are mainly engaged in agriculture. By the end of 1955, China had more than 190,000 hsiangs. Since then, a nation-wide re-division of hsiangs has been in process necessitated by the fact that quite a number of agricultural producers' co-operatives have grown in size to embrace peasant households not only on one hsiang but of two or more. They are now more than 110,000 hsiangs.

After re-division a hsiang on the plain will have roughly 10,000 inhabitants or as many as 15,000 in densely populated regions with an area of 2.5 kilometres in radius around the seat of the local Hsiang People's Council. Similarly a hsiang in hilly regions will have 5,000—8,000 inhabitants with an area of 5 kilometers in radius and a hsiang in mountainous or for flung region 2,000-3,000 inhabitants with an area 7.5 kilometres in radius.

8. These stations also serve as centres for giving special short-term training to co-operative farmers. In some cases, the farmers go to the station in their off-time for the purpose of training and in other cases the technical experts from the station go to the village and give training to the farmers on the spot. Up to the end of May, 1956, 5,08,000 farm workers had been trained in the short course. The trainees included directors of co-operative farms, accountants, agricultural and animal husbandry technicians, brigade and team leaders, etc. Many co-operative farms have also set up their own organisation to study farm techniques with the help of these Technique Popularisation Stations. These stations thus play an important part in introducing better farming methods, such as, use of improved types of farm tools and better seeds, making better use of fertilizers and manure, adopting plant protection measures and improving agricultural skills, etc.

9. *Detailed account of Nanyuan T.P. Station*—The role of a Technique Popularisation Station in developing China's agriculture can be best understood if we describe here a station that we visited near Peking.

10. *Staff, facilities, coverage*.—This station, called the Nanyuan Technique Popularisation Station, was first established in 1953 with a staff of 3 technical and 2 administrative personnel. There were, however, some teething troubles and the station was closed in 1954 due to shortage of properly qualified technicians. The station was, however, restarted in 1955. At the time of our visit, it had 14 members on the staff of whom 9 were technical. Among these 9, 4 were field crops, 4 for animal husbandry and 1 for vegetables. In this particular Technique Popularisation Station, agriculture and animal husbandry were combined but there was a proposal that with the increase in the volume of work, the animal husbandry section would be separated from the agricultural section in the near future. Of the 5 non-technical men, one was the director, who was a former member of the liberation army, 2 were clerks and 2 were ordinary labourers. The junior-most technician in the station got a salary of Rs. 60 per month while the chief technician got a salary of Rs. 180 per month. The station had a small library and a collection of extension literature and its main hall was decorated with instructive posters, charts, etc., all relating to various techniques for the improvement of agriculture. There was no artificial insemination centre attached to this station. There was, however, 2 holstein stud bulls and 2 stud horses which were being maintained by one of the co-operative farms attached to the station and were used for the purpose of breeding in this particular area. The station had no land of its own and whatever experiment it wanted to carry out was done in the lands of the co-operative farms of the area and with co-operation of the farmers themselves. There is a hostel attached to the station where co-operative farmers who come for training are housed. The annual budget of the station was reported to be about Rs. 30,000 and the expenditure on staff was about Rs. 24,000, the balance being contingent expenditure. This station served 14 hsiangs in which were included 37 co-operatives and about 18,700 households. The farthest farm was at a distance of $7\frac{1}{2}$ miles from the Station. The station was under the technical control of the Bureau of Agriculture of the Peking Municipality and under the administrative control of the District People's Council.

11. *Function*—The main function of the stations were—

- (1) popularisation of scientific knowledge regarding agriculture, e.g., use of fertilisers, growing of field and vegetable crops,

methods of controlling diseases, insects and pests, improvement in the method of cultivation and management of land, etc.;

- (2) summing up the experience of advanced farmers and extending his advanced experience to other areas;
- (3) helping the farmers in the knowledge of animals both in regard to breeding and prevention of animal diseases;
- (4) training of technical cadres for the co-operative farms

12.1. *Activities training*—The period of training varies according to the subject. For example, the period of training for pig feeding lasts 7 days, for cattle feeding 10 days, for vegetable growing 12 days. Generally, lectures are also given on the cultivation of crops and other related subjects. At these discussions, the model workers also narrate their experience and group discussion is encouraged. Technicians from the Agriculture Bureaus and Agricultural Research Institutes also participate in the discussions. During the period of training, they earn work points from their respective co-operative farms. Government provides them with cheap meals at a concessional price of about 5 annas per day. The farmers are given training in the hostel during the off-season namely December to February. During other seasons, the technicians from the station go to co-operative farms and give the farmers on-the-spot training. This two-way traffic helps a great deal in extending knowledge to the farmers and in collecting first-hand information regarding problems of the farmers to be passed on to research workers for investigation. The station had last year 159 trainees in animal care, 102 in pig raising, 182 in field crops and 215 in vegetable growing. Besides these people who received training at the station itself, 1,261 peasants received training in the villages during the busy season.

12.2. *Technical guidance*—The type of advice and help which the station gave to the farmers may be described by a few illustrations. Last year, the early sowing of cotton was completed by the 8th of April. A complaint was received that seeds did not germinate even after 2 weeks although the normal time of germination was only one week. Wherever the seeds had germinated, the germination was defective. The technicians of the station discovered that this defective germination was mainly caused by the fact that the temperature was unduly low at the time of sowing. The cultivators were advised to resort to transplanting the cotton seedlings in gaps if they were not very many or else to sow afresh.

12.3. On another occasion there was an attack by an insect pest called army worms. The technicians of the station tested the outbreak with a special apparatus and discovered that the attack might soon become very serious. An intensive spraying with insecticide 666 was immediately undertaken. This year, as a result of heavy rains the cotton crop was seriously damaged. The technician of the Station himself was unable to suggest a remedy. He, therefore, brought experts from the North China Agricultural Scientific Research Institute down to the farm who suggested various measures for different types of damages. The technicians of the station were equipped with soil testing kit on the basis of which they advised the co-operative farmers regarding manurial schedule, lime requirement of soil, etc. They had other equipments also, e.g., equipment for testing germination percentage of seeds, soil thermometer, etc. They kept a record of the temperature of the soil and advised the farmers as to the right time when seeds should be sown.

12.4. *Demonstrations in co-operative farms*—They also carried out in the co-operative farms different demonstrations and experiments on thick sowing, close planting, deep ploughing, etc., with the help of the farmers themselves and persuaded the co-operatives to demarcate separately areas for the production of improved items of work on which proper roguing was insisted upon. At the time we visited the station, one of the important items of work on which they were busy was in regard to advising the cultivators on the topping of cotton plants to encourage more fruiting branches on the plants.

13. *Contact between farmer and research worker*—These Technique Popularisation Stations are thus playing an extremely important role in the development of China's agriculture. They are educating the farmers in improved techniques and passing on to them the results of research. On the other hand, they are also helping to maintain contact between the farmer and the research worker and to pass the problems of the former to latter. They are also providing a very useful balancing factor in the whole process of development of co-operative farming. Quite a large part of the progress that has achieved in China so far is, no doubt, due to the enthusiasm and hard work, better organisation, etc. But a stage will come when there will not be very much further scope for increasing production through these factors alone. It is at that stage, that the technical service provided by the Technique Popularisation Stations will come to aid and will help to make up more than what may be lost through the natural wearing off of initial enthusiasm with the passage of time.

14. *T.P. Stations not multi-purpose organisations*.—The prospect for future development of China's agriculture has indeed become bright as a result of the organisation of these Technique Popularisation Stations. One special thing about the Chinese Technique Popularisation centres is that they are not multi-purpose organisations. Their main work is agricultural extension and they stick to that work only. They have nothing to do with the provision of credit or provision of supplies. This is an important point which is worth underlining here. In India, much of the time and energy of the village level workers and even of technical officers at higher levels are taken up by the need for looking after credit, supplies, etc., and by the fact that they have to look after not only agriculture but also a number of other subjects like education, health, etc. We feel that the fact that the Technique Popularisation Stations in China are not multi-purpose institutions but are primarily agricultural extension organisations, have been responsible to a considerable extent for the concentrated attention that the Chinese farmers are paying to increasing their production today.

15.1. *Training of agricultural personnel*—The programme for development of agriculture as also for promotion of agricultural research requires a very large number of trained personnel at various levels. China has, therefore, launched a very large programme of agricultural education and training. Agricultural education in China can be broadly divided into five categories:

- (1) Higher education.
- (2) Agricultural middle schools.
- (3) Training of co-operative cadres.
- (4) Training of technical workers.
- (5) Training of cadres in their spare time.

15.2. *Higher agricultural education*—All the institutes of higher agricultural education in China are controlled by the Ministry of Higher Education. Altogether, there are 29 colleges of agriculture and forestry in the country with a total teaching staff of 3,000 inclusive of professors, instructors, etc., and 17,000 students. The capacity of these colleges is proposed to be expanded very considerably. They will admit 15,000 new students this autumn and 20,000 in the autumn of 1957. With the total planned enrolment, it is expected that the number of students would go up to 37,200 at the end of the First Five Year Plan. The output of agricultural graduates last summer was 3,400. It is expected to be about over 6,000 next year and 8,000 by 1959. The total number of students who are expected to graduate from these colleges during the five year period 1953-57 is 18,800.

15.3. The students admitted to the agricultural colleges are drawn from amongst the graduates of middle schools, secondary agricultural schools and also from amongst the cadres working in administration, business and agricultural organisations having necessary cultural and political background. All students to be admitted have to pass an entrance examination. This entrance examination is fairly stiff and eliminates the unfit so that the percentage of failures amongst those who are admitted is negligible.

15.4. Up to 1954, all the students admitted to agricultural colleges were given studentships, the value of which was about Rs. 24 per month. The students who were formerly cadres working in Government or other organization, were given studentships of Rs. 64 per month, the actual amount depending on their grade. During the period of studentship, however, they are not entitled to draw their pay from their parent organization. Since 1954, however, the studentship has been made flexible and is determined according to requirements of the individual cases. No tuition fee is charged from the students.

15.5. The course for agricultural graduates is at present of four-years' duration. There is, however, the proposal to increase it to five years.

Specialised courses are given in—

- (1) Agronomy.
- (2) Horticulture.
- (3) Agricultural chemistry.
- (4) Livestock breeding and animal husbandry.
- (5) Veterinary science.
- (6) Sericulture.
- (7) Tea.
- (8) Agricultural economics.
- (9) Agricultural mechanization.
- (10) Agricultural water conservancy.
- (11) Plant protection.
- (12) Land use planning and farm management.

15.6. It is proposed to set up more specialised courses in the future as the need for them develops. The general course includes the common lessons, e.g., mathematics, physics, chemistry, certain basic technical lessons with special emphasis on agricultural problems and specialised lessons on the different special courses. Common lessons are given to all the students in the first year. The basic technical lessons are given in the first and second year, and the specialised course begins from the second year. Emphasis is

placed on practical training alongside theoretical training on the farms and laboratories attached to the colleges. In the last two years of the course, practical training is given on State farms or co-operative farms and students are required to go through the whole process of agricultural production. Four months are exclusively reserved for this work in the last year of the course. Students are examined at the end of each college term and also at the end of the final year. Not more than five subjects are to be offered at a time so that the burden on the students may not be too great. The percentage of failure is very small, usually 1 to 2 per cent and in no case more than 5 per cent.

15.7. Most of the professors and other teachers in these colleges do undertake research work under the guidance of the research institutes. They constitute the main research force in China. There is a close relationship between the research workers in the *Academia Sinica* and the research workers in the Agricultural institutes and colleges. It is felt in China that no professor can do his job well unless he spends some time in research work and, hence, in arranging the teaching programme, care is taken that there is a proper balance between teaching and research work.

16.1. *Secondary agricultural education*—As a result of the rapid development of agricultural co-operatives since the latter part of 1955, a great shortage of agricultural technicians is being felt. Large scale measure have, therefore, been taken to expand facilities for secondary agricultural education. By the end of 1955, there were 94 secondary schools of agricultural education with 44,000 students and the teaching staff of 3,500. On an average there were three to four such secondary schools in each Province. Kwangtung province has as many as 9 such schools. Most of the existing 94 schools are being expanded and 60 new schools are proposed to be established later in 1956. During 1956, about 8,000 students graduated from the secondary agricultural schools. The number of enrolment in 1956 was 70,000 as against 44,000 in 1955. It is expected to go up to 98,800 in 1957. The total number of students to be graduated from the Secondary Agricultural Schools during the Five-Year period 1953-57, is estimated 82,900.

16.2. Students who have passed through the Junior Middle Schools or persons who have got general education of that standard can apply for admission to Secondary Agricultural Schools. Most of the students come from peasant families and have a village background. The training lasts for three years and includes the following specialised courses :—

- (1) Raising of crops.
- (2) Production of fruits and vegetables.
- (3) Plant protection.
- (4) Animal husbandry.
- (5) Veterinary science.
- (6) Sericulture.
- (7) Tea.
- (8) Agricultural machinery.
- (9) Agricultural accountancy.
- (10) Agricultural statistics.

16.3. In these courses, relatively greater emphasis is put on practical training than in the agricultural colleges. Each student is required to work for a certain minimum period in a farm during the period of training. The students are being given studentships of the value of Rs. 24 per month to defray their expenses on food. Besides training regular students, the secondary agricultural schools also organize short courses for the benefit of cadres actually working in co-operative farms.

16.4. In implementing their programme for expanding the existing secondary agricultural schools and starting new ones, the Chinese authorities are experiencing great difficulty in securing sufficient number of qualified teachers. They are trying to solve this problem by recruiting, for this purpose most of the new graduates from agricultural colleges and also drawing upon Government agricultural departments and institutions, although the latter are themselves short of staff. They have somehow managed during the current year but they envisage considerable difficulty during the next two or three years. There is much greater demand for training facilities than the Government are able to provide even with this expansion programme. They are, therefore, arranging to provide refresher courses to the technical staff of Government departments, State farms, co-operative farms etc.

16.5. For this purpose, more than 10 schools for training of technicians attached to State farms have been started. In addition, special courses of practical training are being arranged by rotation at different Technique Popularization Stations and on bigger co-operative farms. The Technique Popularization Stations had a staff of over 50,000 last year. In 1956, the number has become more than 100,000. For these personnel also, lectures and special courses are being arranged by the Provincial Agricultural Departments. The Technique Popularization Stations have trained, by May 1956, as many as 580,000 cadres of the co-operative farms. The trainees included directors of co-operative farms, accountants, agriculture and animal husbandry technicians, etc.

17. *Training co-operative cadres*—Special schools for training co-operative cadres have also been started to give training of three to six months duration, depending upon the subject of specialization. In the current year, 83 such special schools are being set up and it is proposed to increase the number to 118 next year. It is estimated that 300 to 400 thousand cadres of co-operative societies will be trained next year and about 2 million cadres within a period of five years. The aim is to provide 4 to 5 trained cadres for each co-operative farm within a period of five years. In addition to this programme for the training of cadres of co-operative farms, there are also special institutions run by the Supply and Marketing co-operatives for the training of their staff. These co-operatives at present run the co-operative college, 30 co-operative schools and 53 short term training courses on co-operative marketing. 72,000 people received training in various short term courses in 1955. In addition, spare time vocational study is strongly encouraged among the staff of these co-operatives. There are now 546 full-time and 1,317 part-time teachers employed in 430 counties of 12 provinces who make regular lecturing tours of the lower level co-operative societies with a view to training their regular cadres. Besides this, correspondence courses are organized for such cadres as cannot attend even the short course or the part-time course.

18.1. *Training of personnel for research work*—In addition to the training facilities described above, for agricultural cadres, extension workers etc.,

special facilities have been provided for the training of research personnel. The total number of scientific research personnel in the field of agriculture is at present 2,700 in the Senior Grade and 1,700 in the Junior Grade. According to the twelve-year programme for 1956—67, these numbers will go up to 29,000 in the Senior Grade and 15,000 in the Junior Grade. These personnel will work in agricultural research institutes both at the Centre and in the Provinces. There is, therefore, considerable need for training of personnel for this work. This function has been entrusted to the *Academia Sinica*. The Academy selects suitable agricultural graduates for higher training both in the country as well as abroad, sends experienced scientists on short visits to foreign countries and also arranges for the visit of eminent experts from foreign countries and organizes short-term seminars or training courses on specialized subjects. In the five-year period 1953—57, about 10,100 students will be sent abroad for study of whom 9,400 will go to the U.S.S.R. In addition, about 11,300 students will be sent to the U.S.S.R. and the Peoples' Democracies for practical training. Quite a large proportion of these scholars and trainees will specialise in subjects relating to agriculture and animal husbandry. All students who graduate from agricultural colleges or schools are assured of employment. In fact, even while the student is in the final year, a decision is taken as to where he will be posted on graduation so that there is no waste of time after a student graduates.

18.2. On the whole, we found that steps were being taken in China in a very big way for the development of research and for the training of technical personnel so necessary for national re-construction. The Chinese authorities emphasize that nothing is more valuable for the purpose of economic development than trained personnel and hence they are taking the greatest care to see that requisite number of technicians are trained well in time and that whoever has received training is not wasted even for a short period.

RECOMMENDATIONS FOR STRENGTHENING ORGANISATION FOR AGRICULTURAL EXTENSION IN INDIA

19. There is not yet sufficient appreciation of the fact that the national extension service pattern, while being basically sound, needs to be greatly strengthened if the results hoped for by way of increase in agricultural production are to be realised. This is necessary, in particular, in four directions :—

- (a) Besides the extension staff at the block level, there should be agricultural, animal husbandry and co-operative personnel at the level of a group of, say, 15 to 25 villages;
- (b) The present jurisdiction of the multi-purpose village level workers, namely about 10 villages is, on the whole, too large for the purposes which we have in view. By training more workers we should try as early as possible to reduce the area of the village level worker by, say, one-half.
- (c) There is need for well-organised demonstration and training centres at the block level. These centres would provide services similar to those rendered by Technique Popularisation Stations in China. Further, in each block the demonstration centres at the block headquarters should be supported by smaller centres for demonstration, teaching and exchange of experience among farmers in each group of 15 to 25 villages. Such a group may also have co-operative seed store and arrangements.

for the supply of fertilisers and agricultural accessories as well as more effective coordination between agricultural credit and marketing; and

- (d) While a multi-purpose village level worker has much value as an extension agent working with peasants and co-operatives, the need for strong technical cadres at all levels in agriculture, animal husbandry etc., and for research and experiment on local problems should receive much greater recognition than at present.

(ii) AGRICULTURAL EDUCATION, RESEARCH AND EXTENSION IN DENMARK

1.1. *Brief survey of agricultural situation*—The total agricultural area (1954) was nearly 7.5 million acres divided into two lakh holdings. 20 per cent of the holdings were under 12.5 acres, 25 per cent between 12.5 and 25 acres, 40 per cent between 25 and 75 acres and the rest above 75 acres. About 28 per cent of the population live exclusively by agriculture.

1.2. The agricultural area has shown a decline since 1938, the net decline by 1954 being nearly 5 lakh acres. In spite of this agricultural yields have increased.

2.1. *Organisation of education, research and advisory work*—Denmark's economy depends very largely on her ability to maintain a high level of agricultural exports. The research and advisory services along with the influence of the agricultural and folk high schools have contributed much towards this.

2.2. As in other spheres research and advisory services the largely organized by farmers' associations with financial aid from Government the Government, confining itself exclusively to higher research and education and coordination of the work of these associations.

3.1. *Agricultural Education*—The centre of agricultural research and higher education is the Royal Veterinary and Agricultural College which has charge of the training of Veterinary Surgeons, Graduates in Agriculture, Surveying, Horticulture, Forestry and Dairying. In reality it is not one but six colleges. Its task is twofold; higher education sustained by research. This is financed and controlled by the State.

3.2. The qualifying examination for the courses in Veterinary Science, Surveying and Forestry is the Higher School Certificate. The courses in Agriculture, Horticulture and Dairying require lower scholastic attainments; in addition the candidate must have taken a course at a recognised agricultural, horticultural or dairying school and must have considerable practical experience; 3, 4 and 5 years respectively. This extensive practical training is something peculiar to Denmark, the idea being that those who are going out as theoretical Advisers should be well armed with a practical knowledge.

3.3. *Duration of the courses*—Students receive a thorough grounding in the natural sciences which monopolises the first course in all subjects lasting from one to one and a half years and ending with the first part of the examination. This first course is usually in the form of common lectures. After this common course teaching branches out into the various lines, which vary considerably in length. The course in veterinary Science is of 5½ years duration. The courses in agriculture and horticulture are 3 years' duration.

The actual professional studies presume a knowledge of agricultural and horticultural practice and are of a purely theoretical nature. The course is designed for the training of agricultural consultants, teachers, research workers, landscape gardeners etc. In addition to the ordinary course there are a one year's supplementary course and a special course of 2 years. The course in surveying is one of 5 years' duration, and that in forestry of six years. Students for the forestry course pass their first year in one of the recognised forests so as to become acquainted with the practical side of forestry. Then follow 4 years of theoretical studies at the college rounded off by a further year's residence in a forest during which a series of practical tests are undergone. The Dairying Course is planned to last 3 years. The students are fully trained dairymen and receive a purely theoretical training to fit them for positions as managers of larger dairies, dairying consultants and teachers, laboratory and research technicians.

3.4. A feature common to all courses of instruction at the college is that, apart from certain practical work, they are optional, *i.e.*, not obligatory. Candidates for examinations are not obliged to attend the prescribed college courses, though they usually find it necessary to do so, and unremittingly too, moreover.

3.5. On an average about 230 students are admitted annually. For want of accommodation admission to the courses of Veterinary, Surveying, Forestry and Dairying is limited.

3.6. The staff of the college number 42 professors and 17 lecturers. The staff also include 110 readers and scientific assistants, of whom some however, are not occupied with instruction but with research.

3.7. There are 28 agricultural schools; the courses have a duration of 5, 6 or 9 months. About 2,500 attended these schools in 1953.

3.8. In addition there are 30 folk high schools with instruction in agriculture.

4.1. *Agricultural Research*—Most of the faculties of the college are occupied with instruction as well as research. In addition the college has a few pure research institutions. A considerable amount of research work (which may be termed applied or local) is done by Advisory Staff appointed by organisations of farmers through Plant Culture Societies and Livestock Research Societies which get grants from the States. These local advisers carry out nearly 3,000 field experiments each year. The individual adviser has much freedom in the planning of his experimental work. Their work is supervised and co-ordinated by the Government Plant Culture Research Committee and the Committee on Livestock Research.

5.1. *Agricultural Extension*—Advisory work is not organised by the State but by the organisations of farmers. The Advisers are appointed by the local farmers and small-holders' associations, of which there are 138 and 1,360 respectively in the whole country. An Adviser is often shared by several neighbouring associations. The associations pay themselves the advisers, but receive Government subsidies for the salaries according to specified rules. There were nearly 600 Advisers in 1950.

5.2. The difference in the resources of the societies is directly reflected in the intensity and variety of staffing in different areas, the wealthier societies usually having at least three advisers—one in crop husbandry, one in animal husbandry and one in accountancy, the smaller societies generally combining

to appoint one or more advisers. One special feature is the tendency to appoint advisers in special branches rather than in general agriculture.

6.1. *Fisheries*—In Denmark there is a separate Ministry of Fisheries for promoting the interests of the industry which it does by means of legislation and by fishing inspection carried out for the good of the industry and the fishing population.

6.2. The State also subsidises a number of scientific institutions, including the Danish Fisheries and Sea Research Institute whose various Departments carry out research. A Technological Laboratory carries out research on matters connected with the processing and preservation of all varieties of fish and fish products.

6.3. Fisherman, fishermen's associations, and industrial establishments may, through their own Fisheries Bank, obtain loans on easy terms for the renewal of vessels and motors, and the establishment and modernisation of plant.

6.4. A comprehensive inspection system with Stations in most of the major fishing posts has been set up to enforce the various laws and regulations.

6.5. Young fishermen get a thorough practical training on board the vessel's only masters of craft larger than 20 tons are required to pass a theoretical test comprising navigation, international rules, engineering and first aid. The preparatory instruction is given at schools of navigation and at special schools established in the principal fishing posts. A fishermen's high school provides a five month winter course of special interest to fishermen covering such subjects navigation, engineering, accountancy, fish biology, foreign languages, etc. All the schools are run by fisherman's co-operatives with grants from the State.

7.1. *General*—The technical and commercial agricultural problems are dealt with largely by Farmer's and Small-holders' Associations through co-operatives. Their work ranges from local research and extension to supply of material and credit to farmers and marketing their produce. There is no activity which is not done on co-operative lines.

7.2. The national organisation dealing with all questions in the Agriculture Council uniting technical and economic agricultural organisations like farmers' societies, small-holders societies and agricultural co-operative societies in close collaboration and for common action, advising the Government and Parliament on agricultural matters and representing agriculture in its foreign relations.

AGRICULTURAL EXTENSION IN JAPAN

[This note is an extract of Appendix A "Man Power Studies—4" issued by the Scientific and Technical Man Power Divisions of the Planning Commission].

1. Notwithstanding Japan's striking progress as an industrial nation, agriculture continues to occupy an important position in her national economy and agricultural population constitutes the greater part of the population. Indeed, the developments of agriculture in Japan since the Restoration of Meiji in 1868 marked the starting point of the modernisation of medieval Japan. A study of how Japan could make such rapid strides in the techniques of agriculture and bring up productivity to its present high level in that country within a relatively short period may provide many lessons which may have value to India in its own efforts at raising the low agricultural productivity obtaining in the country.

2. This note is an attempt to bring out the important role of agricultural research and extension* in the development of efficient agricultural practices in Japan against the background of the general agricultural situation in that country.

BRIEF SURVEY OF AGRICULTURAL SITUATION IN JAPAN

3.1. *Land and crops*—Japan consists of the Main Island, the islands of Hokkaido, Shikoku and Kyushu, and their satellite islets. The territory extends from north to south covering a total area of 36,850,000 hectares. The country is mountainous for the most part; lands under cultivation in the country include farm lands which have a gradient of 15 degrees or more, usually considered quite unsuitable for cultivation. Utilization of land involves arduous effort and yet with all the labour put into the work, the total area of cultivated land comes only to 5,100,000 hectares, equivalent to a mere 14 per cent of the total area of the country. The major part of lands under cultivation is for farming, leaving only less than 10 per cent of the entire cultivated land as grazing lands, or pastures, which is indicative of the fact that arable land in the country has almost exhaustively been brought under cultivation for farming. Due to climatic conditions, mild and humid under the influence of monsoons, approximately 56 per cent of cultivated land consists of paddy fields, mostly with alluvial soil deposited by rivers. Sloping lands, rising grounds and tablelands, which do not admit the possibility of being used as paddy fields are, generally speaking, utilized for making farm lands.

3.2. Lands for agricultural use throughout the country (including meadows, pastures, forest lands for grazing, besides cultivated fields) aggregate 6,544,000 hectares in area, of which 83 per cent is cultivated fields covering an area of 5,401,000 hectares all told. Of the entire area of cultivated fields, about 56 per cent, or 3,005,000 hectares in area, is paddy fields 2,093,000 hectares farm fields, and 304,000 hectares orchards.

4.1. *Climate*—The country lies in a long strip extending from north to south and there are naturally wide local differences in temperature as between various parts of its territory. This makes it possible to raise a great variety of crops, ranging from products of tropics to those of frigid zone. The country, is blessed with abundant rainfall; monsoons from the Pacific bring rains to the coastal districts of the Pacific Ocean in summer time, and, in winter, there is copious snowfall and monsoons blow from Siberia into districts facing the Sea of Japan. Annual rainfall registers 1,000 millimetres or above even in districts with comparatively little rain, and nearly 3,000 millimetres in rainy districts. For about a month every year from mid-June to mid-July, rainy season comes to the country to cover its whole territory, except the island of Hokkaido.

4.2. The climate of Japan as a rule is rainy, humid, and mild. This is favourable for rice crop but it rather handicaps field farming. The annual occurrence of typhoons causes not inconsiderable damage to farm lands, farming facilities and crops, especially waterfield rice.

5.1. *Farming population*—The farm population of Japan constitutes almost half of the country's entire population. Yet, it is only about a half of the whole farm households existing in the country, chiefly those engaged exclusively in farming occupation, that operate their agricultural enterprise commercially, selling their products to consumers in urban districts. The

*Agricultural education is under the Ministry of Education and not under the Ministry of Agriculture and Forestry.

rest, mainly those having some non-agricultural profession besides farming, are significant to the national economy of Japan more as a source of labour supply for commerce and industry in urban areas, than as substantial contributors to the agricultural activities of the country.

5.2. This, however, does not mean that every individual of the vast farm population is actually engaged in farming. The number of farmers actually engaged in farming was estimated at approximately 14,000,000 before the War. As the farm population increased after the War, this number also swelled to reach the figure of 17,890,000 or thereabout in 1949, and though it showed a downward tendency temporarily for a short period from 1950, during the period of Korean disturbance, the number has again been on the rise since about 1953, due to the shrinkage of industrial labour market. There are usually sharp seasonal fluctuations in agricultural activities, and it has been estimated that there may be as large a difference as of four millions, in ordinary circumstances between the persons engaged in farming during the busy and the comparatively idle farming season.

5.3. In pre-war years, farm area per farm household was estimated at 1.07 hectare (1934—1936 average). This dropped to 0.87 hectare in 1952. However, when talking about the scale of farming operation, it is erroneous to judge according to the dimension of farm land as the only standard of measurement. The agriculture of Japan is highly intensive and, small as the farm area per household is, productivity per unit of farm land is very high.

5.4. The number of families engaged in farming in Japan had been hovering around the figure of 5,500,000 since about 1926 up to the end of the War in 1945. For some time immediately after the War, sudden increase was seen in this figure, largely due to the repatriation of overseas residents and the demobilization of armed forces, and the peak was reached about 1948, when the number came to exceed 6,200,000. Since then, however, it has been showing a tendency to decrease, though very slightly; according to indices with the year 1941 as 100, the year of 1950 stood at 114.1 and there was a slight decline to 112.8 in 1954.

6.1. *Agricultural productivity*—As a rule, the agriculture of Japan is organized on the basis of small-farming system, where farming activities depend largely on the labour of practically all members of a farm household, even including women and children. Furthermore, while the country offers much too scanty arable land for the vast farming population, the number of farm households is increasing every year. This naturally results in a continuous tendency for farm area for farming family to become even smaller.

6.2. In the circumstances, the advancement of Japanese agricultural production has to rely upon more concentration of capital and labour on a specified area of farm land, and more intensified utilization of land. The percentage of land utilization, for instance, has risen at present to 144 from 128 in pre-war period. Of the total acreage of land under cultivation throughout the country, crops for the nation's staple food take up overwhelmingly a large percentage; that is, rice accounts for 38.8 per cent and wheat, 21.9 per cent. The percentage of livestock products though gradually increasing after the war, is still insignificant in comparison to farm products.

6.3. Efforts of farmers to increase production are directed towards increasing yields per unit of land they till. Japan is next only to Italy and Spain in the list of countries of the world in rice crop per hectare of land, and when compared to countries in southeast Asia, her productivity is double or three times as high.

Table A.1 : Productivity of Rice : Yield per unit of area

Country	yield : 100 kg. per hectare	
	1934-38	1950
	(average)	
Italy	53.0	49.4
Spain	62.0	52.1
Japan	36.3	37.6
U.S.A.	24.7	26.8
Brazil	14.8	16.2
Egypt	34.9	42.2
India	13.6	10.1
Indo-China	11.6	12.2
Burma	14.1	13.6*
Indonesia	22.6	22.5
Thailand	12.9	12.8
Philippines	10.9	12.1
Korea	22.4	29.1*
Formosa	24.6	24.2*

Source : Year Book of Food and Agriculture 1952.

*Estimated.

6.4. The agriculture of Japan owes its high productivity of today largely to the development of agricultural techniques achieved during a long period of time ensuing the Restoration of Meiji. Efforts were exerted assiduously during this period towards the betterment of the techniques of farming, particularly plant breeding or the improvement of plants species, popularization of chemical fertilizers, extermination of blight and noxious insects, and so on. No efforts were spared for raising the productivity of farm labour by means or readjustment of arable land, encouragement of tilling by use of animal power and mechanical power, improvement of land etc. The index of rice crop per unit of farm land for the average of five years between 1948 and 1952 registered 158.8 as against the 100 for the average of ten years between 1883 and 1892, giving a measure of what was accomplished by such enthusiasm for technical improvement.

6.5. The secret of this success lies in the importance given to research and extension service for agricultural improvement in Japan.

AGRICULTURAL EXTENSION IN JAPAN

7. Extension work aims at the development of a more efficient agriculture, an increase in agricultural production and improvement of farmer's living conditions, through dissemination among farmers of practical information and techniques related to better agriculture and home living.

8. *Main characteristics*—The following are the main characteristics of extension work in Japan.

8.1. *Extension work is carried on in close relation with experiment and research institutions*—The work of extension centres around extension advisers and subject matter specialists.* While the advisers provide farmers in

*Extension advisers receive a salary of Yen 15,000 per month (Rs. 200) Subject matter Specialists receive a salary of Yen 30,000 per month (Rs. 400).

daily contact with them with guidance and advice, the specialists provide the advisers with technical assistance. These advisers and specialists are, so to speak, a link connecting farmers with the experiment and research institutions. The results obtained by an experiment and research institution are passed on to farmers, while the various questions or problems of farmers which require some experiments or researches, are referred to the experiment stations for their solution. In this sense, extension advisers are not mere town, village or association technicians.

8.2. *Extension work does not give such guidance as will rely on commodities or subsidies*—Not long ago in Japan, technical guidance was often given in association with programmes of distribution of commodities or the grant of subsidies. In many cases, however, with the increase of such affairs, technicians became mere clerks before they became aware of it, and on the other hand, farmers regarded commodities or money as their sole objective, with the result that development of technique itself was hampered. The situation has now changed. Extension advisers engaged in technical guidance are no longer concerned either with the allocation of commodities or money, encouragement of food delivery, or even with the inspection of agricultural products, because if they engage in such affairs it will necessarily become difficult for farmers to ask frankly for their advice.

8.3. *Extension work gives overall guidance adapted to the actual conditions of farmers*—Technical guidance provided in extension work is not concerned with 'technique' in a narrow sense. In the past the traditional technical guidance in Japan had sometimes failed to meet the practical needs of farmers owing to its excessive specialisation. Extension advisers seek to be not mere specialists but agents who are capable of giving overall technical guidance, adapted to the actual conditions of farmers. The subject-matter specialists help these advisers in the fields of highly specialized knowledge and technique.

8.4. *Extension work uses various types of extension methods*—In the activities of extension advisers, guidance or advice is commonly given to farmers through farm and home visits. These advisers often carry out the demonstration of some new technique or show the effect of some new method by making use of a farmer's demonstration farm which goes far to persuade many people of the practical usefulness of the method. They also sponsor table-talk meetings, exhibitions and shows; distribute pamphlets and leaflets; and sometimes make use of slides and motion pictures.

8.5. *Extension work makes it a rule never to force anything on one against one's will*—Extension activity is carried out by the Central Government (the Ministry of Agriculture and Forestry) and local Governments (the Prefectures) in co-operation with each other, the local governments receiving subsidies from the Central Government for the purpose. Guiding the activity is the rule never to force anything on one against one's will, but to carry out all of its activities according to the principles determined by mutual consultation. Furthermore, to understand the farmer's reactions to the actual operation of extension work, the prefectures make it a rule to submit such matters for the deliberation of the prefectural agricultural commissions and the municipal agricultural commissions.

9.1. *Extension work takes up home improvement*—Extension work takes up not only agricultural improvement but also home improvement for farm families. This is necessary because in Japan's agriculture, both farming and home living are combined inseparably. For this reason, extension advisers include not only farm advisers but also home advisers (Women) who take an active part in this work.

9.2. *Extension work encourages rural youth activities*—To improve agriculture and farm home living, extension work also appeals to progressive rural youth and encourages their club activities. In this it differs from the technical guidance given in the past, which appealed, for the most part, to operator farmers in order to realise increased production of some agricultural products.

ORGANISATION FOR EXTENSION

Research Division and Extension Division in the Agricultural Improvement Bureau, Ministry of Agriculture and Forestry

10.1. *Research Division*.—An Agricultural Improvement Bureau, having a Research Division and an Extension Division, was created in 1948 in the Ministry of Agriculture and Forestry. The Research Division has project leaders for 21 subjects, who are in charge of the planning and co-ordination of experiments and researches carried on by the National Institute of Agricultural Sciences, 8 National Regional Agricultural Experiment Stations and 46 Prefectural Agricultural Experiment Stations, one for each prefecture. A total of about 6,500 workers are engaged in agricultural experiments and researches.

10.2. Each prefecture is entitled to a national subsidy, covering from half to the whole of expenditure necessary for some of the experiments and researches to be carried on by its agricultural experiment station.

11.1. *Extension Division*.—The Extension Division in the Agricultural Improvement Bureau of the Ministry of Agriculture and Forestry, is responsible for the efficient conduct of extension work, just as the Research Division of the same Bureau is responsible for the effective operation of experiments and researches. The Extension Division consists of three sections, namely the Extension Section, the Education Section and the Home Improvements Section.

11.2. The Extension Section is in-charge of such matters as the full development of a local extension system, qualifying examination of extension personnel, preparation and distribution of printed matters for extension publicity, production of slides and motion pictures, radio broadcasting, survey of the operational conditions and results of agricultural extension work; holding of shows and exhibitions.

11.3. The Education Section is in-charge of such matters as training institutes for extension advisers and for young farmers, pre-service and in-service training of extension personnel and advancement of their quality, and rural youth clubs.

11.4. The Home Improvement Section is in-charge of such matters as the extension of home life improvement work concerning clothing, food, shelter and home management for farm families as well as the preparation and distribution of materials regarding home improvement.

11.5. Extension work is carried out as a co-operative service between the Ministry of Agriculture and Forestry on the one hand and each of the prefecture on the other. The Extension Division of the Agricultural Improvement Bureau is in-charge of nationwide planning for extension work and determines the amount of subsidy to be given to each prefecture for extension work to be carried out by it. Close contact is maintained between the Research Division and the Extension Division, assistance being given to extension work especially by project leaders of the Research Division. A total of about 12,000 extension advisers are at work all over Japan providing technical guidance to farmers in order to increase agricultural production and improved living conditions.

12. *Regional Extension Supervisors at the National Agricultural Experiment Station*—A National Agricultural Experiment Station is located in each of the eight regions into which the country is divided. Regional extension supervisors and their assistants (one supervisor and one assistant for each station), both national government officials, are stationed at each of these stations. These supervisors are expected to provide extension workers, in their regions, with advice and assistance, mainly from the technical standpoint and to encourage the technical staff of the national agricultural experiment stations to assist extension workers.

13.1. *Prefectural Agricultural Improvement Sections*—Most prefectures have an agricultural improvement section in-charge of various matters regarding extension work as well as experiments and researches. This section is responsible for various matters such as planning for extension work as a whole; qualifying examination for extension advisers and subject-matter specialists as well as their employment and assignment; equipment, appliances and materials necessary for extension work; preparation of printed matter, slides and motion pictures; holding of shows and exhibitions; asking for the opinion of the Agricultural Commission on the operation of extension work etc.

13.2. *Agricultural Commissions*.—Each prefecture and municipality has an Agricultural Commission. The farmers elect the municipal agricultural commissions and the prefecture agricultural commission is elected by the members of the municipal agricultural commissions. The governors of prefectures seek the advice of these commissions on all matters pertaining to extension work and all other questions with which the Agricultural Improvement Sections of the prefectural governments are concerned with. But the commission, on the other hand, reflecting the opinions and desires of the farmers help materially in the formulation and carrying out effective measures.

PREFECTURAL AGRICULTURAL EXPERIMENT STATION AND SUBJECT MATTER SPECIALISTS FOR EXTENSION WORK

14.1. Prefectural Agricultural Experiment Stations are organs attached to the respective prefectural governments, and their primary function is practical experiments and researches combined with extension work. These stations work under the supervision of the agricultural improvement sections set up in prefectural governments to take charge of extension work. In order to maintain close relation between these stations and the agricultural improvement sections, may prefectures appoint the same person concurrently as station director and section chief.

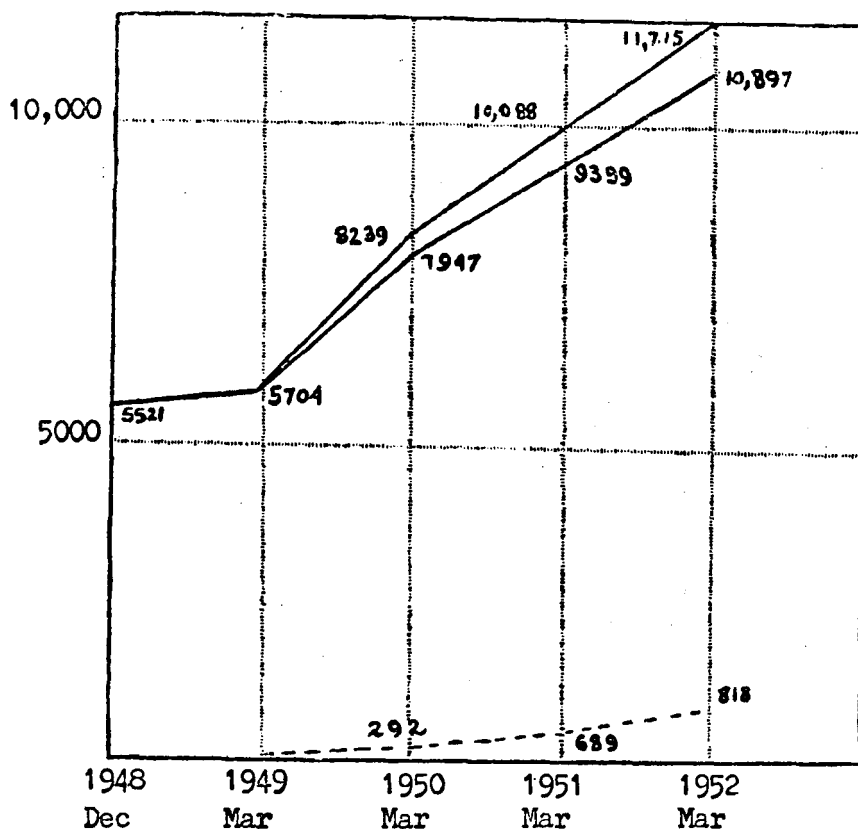
14.2. There are 660 subject-matter specialists, responsible for giving support to extension advisers, 14 specialists for each prefecture on an average. By working concurrently in such stations and sections as much as possible, they maintain close contact with experiments and research, disseminate their results and refer to the experiment stations those problems raised among farmers which must be solved through experiments and researches. It has been prescribed by law that each prefecture is to be provided with a national subsidy covering two-thirds of expenses necessary for employing farm improvement researches to engage at each Prefectural Agricultural Experiment Station in experiments and researches closely related to extension. There are 46 such researchers (one researcher for each prefecture) and a plan is under way to increase them.

15.1. *Qualifying examinations*—It has been laid down by Law in Japan that no person other than one who has passed a prescribed qualifying examination can be appointed an extension worker (extension adviser and subject-matter specialist). Candidates desiring to sit for the qualifying examination for extension advisers, must be junior college graduates, or in the case of upper secondary school graduates, they must have either been engaged in experiments and researches at some agricultural experiment and research institution or in teaching or extension work for over 3 years after graduation. Moreover, as an approximate counterpart to the junior agricultural college, each prefecture has an Extension Adviser Training Institute set up in its agricultural experiment station. This institute serves as a pre-service training centre for extension advisers by giving 2 years' instruction to upper secondary school graduates, playing at the same time the part of an in-service training centre for such advisers.

15.2. Qualifying examination for extension advisers are conducted by each prefecture, while those for subject-matter specialists are held by the Ministry of Agriculture and Forestry. Only university graduates, who have had cover 3 years' career of service at some experiment and research institution after graduation can sit for the examination for entry to specialist posts. Qualifying examinations roughly similar to those for subject-matter specialists are also held for farm improvement research posts.

16.1. *Extension Advisers*—Extension advisers are each stationed at an extension area covering from one to several towns and villages. They are technicians around whom extension work centres. Extension advisers include not only Farm Advisers who are in-charge of agricultural improvement but also Home Advisers (Women) who are in charge of home improvement. Both of these advisers are local public service personnel; the expenditure on account of them is met in large part from the national subsidy for extension work. In about 3,000 extension areas in March 1952, there were nearly 11,000 farm advisers and 800 women home advisers. The rapid increase in the number of extension advisers since the beginning of this work is shown in the following graph :

Number of Extension Advisers Assigned, 1948-1952



16.2. Extension farm advisers are closely connected with various experiment and research institutions. They are kept informed of the results of experiments and researches through subject-matter specialists. They do not engage in such affairs as are concerned with subsidies, food delivery, inspection and control, but devote themselves solely to technical guidance.

16.3. On the other hand, home advisers strive their best to give good advice to rural women on a range of problems such as food, clothing, shelter, home management, child care, etc. It is planned to have ultimately one home adviser for every 5 towns and villages.

17.1. *Subject-matter specialists*—The extension advisers depend upon subject-matter specialists for guidance and help in subject-matter fields. As in the case of extension advisers, these specialists are local public service personnel, expenditure in respect of whom is met largely from the national subsidy. There are subject-matter specialists for 17 fields such as rice, barley, wheat and cereals, vegetables, fruits, farm product processing, soil and fertiliser, plant diseases and insect pests, animal husbandry, home improvement, etc. The number of specialists in each of the 17 fields

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(March 1952) are shown in Table A. 2.

*Table A. 2: Number of subject-matter specialists by subjects
(end of March, 1952)*

S. No.	Subject			Number
1.	Rice plant	..	..	60
2.	Barley, wheat and cereals	..	..	34
3.	Vegetable and potatoes	..	..	52
4.	Fruit	..	..	39
5.	Industrial crops	..	..	23
6.	Disease and insect pests	..	..	53
7.	Soil and fertilizer	..	..	48
8.	Animal husbandry	..	..	61
9.	Livestock hygiene	..	..	10
10.	Agricultural engineering	..	..	0
11.	Farm products processing	..	..	20
12.	Livestock products processing	..	..	5
13.	Farm economy	..	..	48
14.	Home economy	..	..	35
15.	Farm forestry	..	..	5
16.	Fodder crops	..	..	10
17.	Animal power utilization and farm implements	..	..	31
18.	Others (4-H club)	..	..	8
TOTAL		..	..	542

These specialists are stationed either at a Prefectural Agricultural Experiment Station or at prefectural Government office. Maintaining close contact with the Agricultural Experiment Station and other Experiment and Research Institutions, they always think about how to apply the results of a new research to the actual conditions of farmers, and they pass on these results to extension advisers, helping these advisers at the same time to prepare extension plans for each area. Subject-matter specialists also give guidance in such problems as extension advisers are unable to solve by themselves. They also help in the difficult problems which may be raised by farmers and which may require some investigation and research, through their contacts with an experiment and Research Institution. The specialists also write or speak over the radio about the results of experiments and researches in such a manner as may be easily understood by farmers.

OUTLINE OF EXTENSION ACTIVITIES

18.1. Extension advisers carry on their activities on the basis of concrete objectives for improvement, taking into account the prevailing standard of management and techniques adopted by farmers, and various social relationships, along with such natural conditions as weather, nature, of soil, etc., in their assigned areas.

18.2. Efforts are made by the prefectures to carry on extension work in relation to an integrated, practical programme of improvement set out in terms of concrete objectives. In deciding and carrying out the objectives for efficient agriculture, the extension advisers receive the assistance and guidance of subject matter specialists. The improvement of objectives arrived at in this way are put into operation in close collaboration with the municipality and the agricultural co-operative associations.

19. Recent development of extension activities in various prefectures are outlined below :

19.1. *Farm and Home Visits, Extension Promoters and Co-operators*—In the activities of extension advisers, major emphasis is placed on guidance through farm and home visits and the like. Satisfactory guidance, however cannot be expected of extension advisers merely through farm visits, as each adviser has in his charge 600 farms on the average. Accordingly, one or two persons in each community, who are much interested in farm and home improvement, are asked to work with and help these advisers in their activities as Extension Co-operators.

19.2. *'Workshop', Table-talk meetings and Short Courses*—In places which are not favourably situated for farm and home visits from the point of view of location and communication or where there exist agricultural study clubs, table-talk meetings at the community level or 'workshops' in the field are generally held and found to be very effective. The number of 'workshops' and other similar meetings held under the sponsorship of extension advisers averages between 60—70 for each adviser per year.

19.3. *Result Demonstrations*—When after a careful study by an experiment station, a particular crop cultivation method has been recognized as available for extension among farmers, it becomes the responsibility of extension adviser to give guidance to farmers by demonstrating to them the characteristics of the method in such a way as to make them grasp the substance of the technique involved, thereby enabling them to put the method into operation in their own farms with confidence. For this purpose, a number of result demonstration farms are set up in the farmer's fields themselves to carry conviction to farmers about the efficacy of the recommended measures. In 1951, 96,000 results demonstration farms were set up in Japan.

19.4. *Integrated technique demonstration fields*—Sometimes demonstration fields are set up with the aim of solving important problems of agricultural improvement in the extension area concerned through the application of some basic techniques in combination with various related ones. The operation is carried out in the farmer's fields under the joint management of extension advisers and farmers co-operating with extension work, so as to enable the advisers to develop confidence in their own technical advice as well as to provide convincing extension bases for nearby farmers. The integrated technique demonstration fields have come to gain much popularity among farmers. This is partly because a great contribution has been made to their planning through the concentrated efforts of subject-matter specialists and research workers.

19.5. *Operations of Integrated Technical Experiments (conducted in farmer's fields)*.—Experiments and research conducted by the agricultural experiment stations tend to become more and more specialized in various

branches, with the progress of research, and the results of experiments and research tend to be not sufficiently integrated to be applicable directly in actual conditions faced by farmers or are not available in a form which can be readily adopted by farmers of average intellectual and technical standard. For this reason, it has become necessary to carry on experiments which should integrate, for particular purpose, the results of individual experiments and research. This has led to the institution of "integrated technical experiments" from 1953. In carrying out such experiments, an improved type of farming is worked out by technicians of the prefectural experiment stations with the support of subject-matter specialists as well as extension advisers in the district concerned. The aim of these experiments is to put to the test such a method of farming by entrusting a group, consisting of several farm families, with the task of putting it into operation in their fields and through their own efforts. Improved techniques, one so systematized, either set good examples to the agricultural improvement of the district concerned or give useful suggestions. At the same time through the operation of these experiments, many problems are raised to provide basis for future experiments and research to be conducted by the experiment stations. Thus, an important role is played by the integrated technical experiments in combining research with extension.

19.6. *Shows and Exhibits*—Shows and exhibits cover an extensive field such as agricultural and animal products, livestock, agricultural machines and implements, etc. These events not only stimulate the exhibitor's will to improve agriculture, but also help general visitors in acquiring comprehensive knowledge about farm and home improvement. Prizes are awarded by the Minister of Agriculture and Forestry to those persons who display their products or take part in shows, exhibits, etc., held at or above the prefectural level as well as to those persons who have been recognized as having made important contribution to agricultural improvement. In 1951, 182 such events were organised and 967 prizes were awarded. Shows and exhibits of this type which were held during the same year, centering around extension advisers, totalled nearly 250,000.

19.7. *Printed Matters, Motion Pictures, Slides and Radio*—The preparation and distribution of printed matters, practical use of motion pictures and slides, utilization of radio, etc., have been adopted as important extension media. Printed matters are being compiled, separately for extension advisers and for farmers, according to the levels of their knowledge.

The printed matters prepared and distributed during 1951 included 54 kinds (67,000 copies) of pamphlets prepared by the Ministry of Agriculture and Forestry; as well as 669 kinds (1,490,000 copies) of pamphlets, 286 kinds (2,260,000 copies) of leaflets, and 52 kinds (260,000 sheets) of posters prepared by the prefectures.

Visual aids such as motion pictures and slides are at present the most effective media for farmers because such media can be most easily understood by them. The motion picture projectors and slide projectors now in use in extension work total 337 and 4,514 respectively. The motion

pictures and slides produced by the Extension Division are listed below :—

Table A.3 List of Motion Pictures and Slide Films (1952).

Motion Pictures :

1. Green bicycle (what an extension adviser does).
2. Life of a rice-plant.
3. Rice stem borer.
4. Barley and wheat in Japan.

Slides :

1. How to dismember a rabbit.
 2. Weed-killer 2.4—D.
 3. Solid peat fertilizer soil improvement.
 4. Acid soil improvement.
 5. Oilpaper-covered rice nursery.
 6. Kitchen improvement.
 7. How to control snow moulds ?
 8. "Akiochi"—Deterioration of condition of rice crop during late stages of growth.
 9. Silo and ensilage.
 10. How to control a rice leaf-hopper ?
 11. How to control rice blast ?
 12. How to handle a farm electric machine ?
 13. Improvement of an undrainable paddy field.
 14. How to dig sweet-potatoes by animal power ?
 15. Soyabean beetle.
 16. Disinfection of barley seed and preparation for seeding.
 17. Cultivation of a barley field by animal power.
 18. How to make good hay ?
 19. How to identify a high-productive chicken ?
 20. Knack of upland rice cultivation.
 21. How to handle an oil engine ?
 22. Fodder.
 23. Record of a home demonstration group.
-

19.8. *Follow up surveys*—Moreover, to find out to what a degree extension advisers were in contact with farmers through farm and home visits and meetings, random sample surveys were made of farmers in March, 1951 by Saitama Prefecture, Kanagawa Prefecture and Tokyo Metropolis. These surveys showed that half of the farmers in these districts received extension advisers's guidance through farm and home visits, and in the same surveys 58.3% of these farmers were reported to say that workshops and table-talk meetings were held in their communities,

19.9. *Quality seeds*—In Japan, emphasis is placed by the national and prefectural agricultural experiment stations on the development of high quality varieties of rice, barley, wheat and other farm crops. Foundation stock seed farms and original seed farms have been set up in most of the national agricultural experiment stations and the prefectural agricultural experiment stations, respectively. The operation of seed farms aimed at producing seeds for general distribution are entrusted to farmers. Technical guidance and the judging of seeds from these farms are mainly the responsibility of extension advisers. Also, centering around the chemical department of each prefectural experiment station, there are in operation soil surveys designed for increasing the productivity of paddy fields, guidance on improved fertilisation suitable for the respective soils, soil improvement projects for low-productive lands, etc. The extension system co-operates in field aspects of such activities and disseminates the results.

19.10. *Control of Plant Diseases and Insect Pests and Prevention of Animal Diseases*—Since the secret of controlling plant diseases and insect pests is their early control, it is necessary to find out the outbreak of such diseases and insects in the early stage and pass on to farmers information about such an outbreak as soon as possible. For this purpose, extension advisers try to find out an outbreak early, and agricultural experiment stations also carry on the activities of forecasting the outbreak of diseases. In these activities, once there is any evidence of outbreak, extension advisers are informed of the outbreak to pass on such information to farmers, while farmers are directly informed of it through radio, newspapers, etc. In case any warning is given of the outbreak of diseases and insects, extension advisers after consultation with the agencies concerned determine how to control them, and then spread knowledge about how to prepare chemicals and how to use a sprayer, and also give field guidance in these matters. They spread new control methods and offer information about new diseases and insects, and at the same time they carry out, at all times, the extension of control methods through result demonstration farms. The demonstration farms set up for diseases and insects control totalled 11,192 in the year 1951.

Alongwith control of diseases and insects extension advisers try to prevent animal disease and spread and develop knowledge and techniques for such prevention.

19.11. *Other extension activities*—Other activities of extension advisers include examination of soil acidity of farmer's fields and advice regarding the necessary measures for improvement; extension of new chemicals and fertilizers; guidance regarding use of agriculture machinery, electric power and animal power; rational utilisation of farm by-products; farm management and book keeping etc.

20. *Expenditure on Extension and Research*—Out of a total general account budget of 80,272 million yen for the Ministry of Agriculture and Forestry in 1952, a sum of 1,265 million yen was intended for extension and 1,123 million yen for research. The total sum (2,388 million yen) set apart for extension and research represented 3 per cent of the total budget of the Ministry.

PREFECTURAL AGRICULTURAL EXPERIMENT STATION

21.1. Each Prefecture in Japan has its own Agricultural Experiment Station. These stations play an important role in the improvement of

agriculture in Japan and it is worthwhile to study how they function. In this section a brief account of the organisation and work of the Agricultural Experiment Station of Shizouka prefecture is given to illustrate the typical features of these stations.

21.2. Shizouka is one of the 46 prefectures in Japan and has 180,000 farm households and 126,000 hectares of arable land as against 6,010,000 farm households and 5,450,000 hectares of arable land for the whole country.

21.3. The Agricultural Experiment Station of Shizouka was established as early as 1901. The station conducts experiments and makes studies concerning better farming practices and improvement of tools and implements so as to increase production and ensure better management of agriculture. It distributes better varieties of seeds, seedlings and other agricultural species to farmers. It renders technical advice and assistance to extension advisers in regard to measures of agricultural improvement and betterment of rural life.

22.1. *Organisation*—The work of the Experiment Station is organised into four divisions comprising seven units. It has also an Alpine Detachment Office for experiments and studies on agriculture in regions of high altitude and low temperature. The organisational set up of the Experiment Station which has a total strength of 83, is shown in the Chart on the next page. A brief account of the work of each Division and Unit is given below.

22.2. *General Affairs Division*—It deals with general office affairs and accounting. Items which do not belong to any specific division are also handled in this division.

22.3. *Crop and Farm Implements Division*—It consists of Crop and Farm Implements Units. The Crop Unit undertakes studies on and improvement of species and cultivation techniques of principal foodgrains, miscellaneous cereal and cash crops; it has also the responsibility of breeding and distribution of pure seeds. The Farm Implements Unit studies measures for the improvement, inventions and production of models of general agricultural tools, implements and power driven farm machinery as well as testing of their efficiency. Improvement of animal driven farm implements, and machinery and innovation of farming techniques by the utilization of animal power are also the functions of this unit.

22.4. *Pathology and Horticulture Division*—The Division has three Units, viz., Pathology Unit, Entomology Unit and Horticulture Unit.

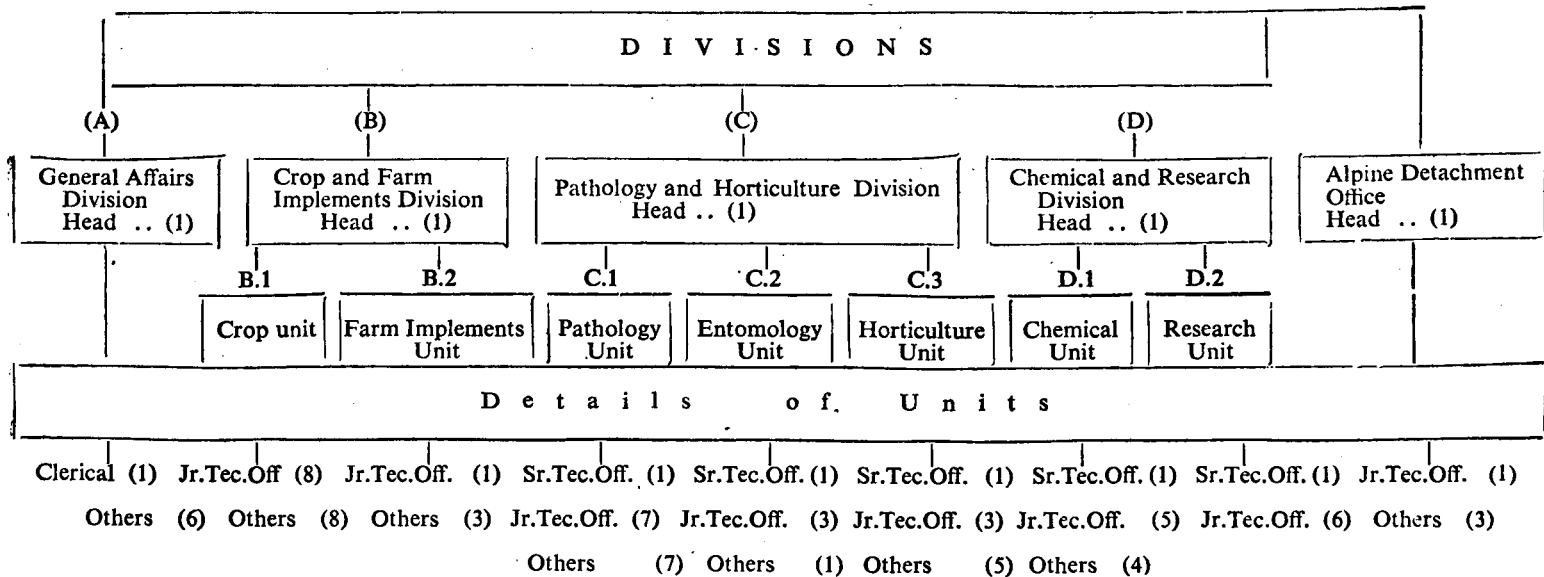
22.5. The Pathology Unit conducts experiments on pests and diseases on agricultural products. It studies agricultural chemicals and is responsible for plant pathology studies in respect of specified agricultural products and evolves preventive and control measures for plant pests and diseases.

22.6. The Entomology Unit studies problems relating to insects harmful to agricultural products and the prevention and control of such harmful insects by the application of insecticides. The unit breeds and distributes predators. It is also responsible for forecasting insect and pest outbreaks.

22.7. The Horticulture Unit conducts experiments and studies on general horticulture, development of Alpine horticulture, and hot-house cultivation of various horticultural plants.

SHIZOUKA PREFECTURAL AGRICULTURAL EXPERIMENT STATION.

Director (1)



22.8. *Chemical and Research Division*—It is comprised of the Chemical Unit and the Research Unit. The Chemical Unit handles problems concerning improvement and regeneration of soil, rational application of fertilizers and analysis of soil as well as fertilizers. It studies general agricultural chemistry and conducts chemical tests on specific agricultural products.

22.9. The Research Unit deals with the improvement of lands of low productivity and undertakes soil study of the reclaimed areas.

22.10. *Alpine Detachment Office*—It conducts research on high altitude and cold region agriculture with a view to increasing production. It is also responsible for the raising and distribution of necessary seeds in those regions.

23.1. *General Regulations*—The Director, Heads of Divisions, Head of a Detachment Office and Heads of Units are appointed by the Prefectural Governor. The Director, who works under the control and Supervision of the Prefectural Governor, is fully responsible for the management of the station. He has to send annual reports to the prefectural Governor on the results of experiments, studies conducted during the year and on other important matters.

23.2. Each Division, unit and detachment office may function in some groups under the leadership of group leaders who are appointed by the Director and are assigned specific work by the senior officers.

23.3. Each head of the division and detachment office is required to submit a report on the experiments conducted within 30 days after completion of the same. In case the results are urgently needed, the Heads may be asked to submit such reports immediately after the work is completed.

23.4. Heads of divisions and detachment office are required to report the kinds and quantities of the agricultural products in the farm at the time of harvest.

23.5 The detachment office and all units have to maintain the under-mentioned books which are to be kept upto date :

(a) *General Affairs Division :*

1. Receipt and issue book
2. Library ledgers
3. Store book
4. Bill register
5. Attendance register
6. Visitor's book
7. Duty Officers diary
8. Financial ledgers as prescribed by accounting regulations.

(b) *All the Units and Detachment Office :*

1. Experiment project book
2. Experimental record book
3. Store book
4. Diary
5. Agricultural products auxiliary books
6. Fertilizer auxiliary books
7. Library auxiliary books

24. *Land and building*—Details about the buildings and lands at the station are as follows :

	<i>Buildings</i>		<i>Land (acres)</i>			
	<i>Number</i>	<i>Total floor space (sq. yds).</i>	<i>Paddy</i>	<i>Dry-field</i>	<i>Others</i>	<i>Total</i>
Shizouka Prefectural Agricultural Experiment Station, Shizouka-City	30	5,630	7.6	6.6	9.5	23.7
Shizouka Prefectural Agricultural Experiment Station, Alpine Detachment Office, Gotonba, Shizouka Pref.	5	423	2.7	2.2	0.2	5.1

25. *Budgetary allocations*.—The experiment Station has an annual budget allocation of the order of 15 million yens (Rs. 2 lakhs approximately). Of this, wages and staff salary account for as much, as 4 million yen, travelling allowances, transportation and communication 3 million and stores and materials as well as supplies another 2.5 million each. The table below gives a breakdown by detailed items :

BUDGETARY ALLOCATIONS

	<i>(Thousand yens)</i>			
1. Staff's salary	..	..	..	190
2. Wages	..	..	..	3,839
3. Stipends	..	..	..	163
4. Compensations	..	..	..	3
5. Supplies	..	..	..	2,409
6. Fuels	..	..	..	343
7. Food-stuff	..	..	..	42
8. Printing and binding		..	..	654
9. Electricity and water		..	..	802
10. Travelling allowances		..	..	2,376
11. Transportation and Communication expenses	..	..	..	622
12. Rents and commissions		..	..	61
13. Consignment fee	..	..	..	890
14. Repairing expenses		..	..	555

BUDGETARY ALLOCATIONS—*contd.*

(Thousand yens)

15. Construction	..	..	..	362
16. Stores	..	..	..	1,512
(a) General	..	..	..	166
(b) Experimental	..	..	..	1,297
(c) Book and literatures	..	..	..	48
17. Materials	..	..	..	100
(a) Seeds and seedlings		..	..	27
(b) Animals	..	..	..	8
(c) Miscellaneous	..	..	..	65
18. Purchases	..	..	..	3
19. Incidental charges		..	..	25
TOTAL				14,951

PREFECTURAL AGRICULTURAL TRAINING INSTITUTE

About the same time as the agricultural experiment station came into existence, in Shizouka, an Agricultural Training Institute was also established there. This prefectural institute impart practical and theoretical training in every branch of agriculture for a two year graduation course. The graduates turned out are eligible to be appointed as Extension Service workers and have a status equivalent to that of specialists. They can also appear for extension or specialist examinations.

27. The minimum qualification for admission into these institutions are :—

- (a) Graduates from 'new system high schools', *i.e.* those who have undergone twelve years of education.
- (b) Graduates of 'A' class agricultural schools with more than one year's experience in research/education in a recognised institute or experience in agricultural extension work for more than one year.

28.1. *Lands and Buildings*—The Institute has a number of buildings each for a special purpose. In addition, there are other buildings common with the Agricultural Experiment Station. The total floor space of institute's own buildings is 1,711 sq. yds. spread over 38 rooms. This includes a school shed with 7 rooms, measuring a floor space of 452 sq. yds. which can accommodate 100 people, two dormitories with a total floor space of 801 sq. yds., and having accommodation capacity for 56 people. The institute has greater part of its buildings and laboratories in

common with the Experiment Station. The table below gives details about the various buildings :

<i>Kinds of buildings</i>	<i>Institute's own bldgs.</i>		<i>Common with experi- ment st.</i>	
	<i>Number of rooms</i>	<i>Floor-space (in sq. yds.)</i>	<i>Number of rooms</i>	<i>Floor space (in sq. yds.)</i>
School shed (1 block)	7	330	..	..
Class rooms	2	160	..	..
Laboratory	1	64	..	..
Library	1	48	1	80
Office	1	42	..	..
Model kitchen	2	16	..	..
Dormitory (old—1 block)	6	198	..	..
Dormitory (new—1 block)	..	603	..	..
Residential quarters	9	360	..	..
Dining hall	1	75	..	..
Hostess room	1	16	..	..
Wash stand	1	12	..	..
Toilet	1	15	..	..
Kitchen	1	36	..	..
Storage	1	8	..	..
Cook's room	2	37	..	..
Lecture hall	..	..	1	370
Sample room	..	..	1	120
Farm instrument shed	..	..	1	300
Warehouse	..	..	2	426
Compost shed	..	..	1	160
Hot-houses (2)	..	..	2	180
Pig shed	..	..	6	83
Godown	1	21	..	..
Seed laboratory	..	..	1	63
Farm machinery test room	..	..	1	192
Chemical laboratory	..	..	1	120
Inspect test room	..	..	2	48
Pathological laboratory	..	..	2	40
Horticultural test room	..	..	1	40
TOTAL	..	1,711	..	2,222

28.2. Similar is the case with the experiment and demonstration farm. The Institute has only 0.1 acres of upland fields of its own. It shares, in common with the Experiment Station, 8 acres of upland fields, 8 acres of paddy fields and 1 acre of vegetable field.

28.3. As regards livestock, the Institute has two pigs and it has three cows in common with the Experiment Station.

29.1. *Students and teachers*—There were 26 students in the first year and 20 in the second year as against the authorised capacity of 30 in each of the two classes.

29.2. The Institute has 2 professors, of whom one is a director of the Institute, two assistant professors who are all on fulltime basis. Professors and assistant professors and adjacent colleges and farms also give occasional lectures to students.

30. *Working days and school hours*—An academic year is divided into two terms. The first term is from April to September and the second from October to March, each of 21 weeks duration. The school works for 7 hours a day on week days and 3½ hours on Saturdays with Sunday as a holiday. One week in each term is devoted for the bi-annual examinations.

31.1. *Curriculum*—The Curriculum of the Institute covers a wide range of subjects and training is very intensive. It can broadly be divided into two heads :

(a) Theoretical or academic

(b) Practical training.

The time allotted to different subjects in the curriculum is given in terms of 'units'. A unit consists of one hour per week for 15 weeks in the case of theory, and 3 hours per week for 15 weeks insofar as practical or technical work is concerned. But for 4 units of study devoted to English language in the second year, theoretical or academic study is confined to the first year, whereas practical training is given in both the years. The allocation of time for different subjects of theoretical or academic study are as follows :—

A. Curriculum for theoretical studies:

Subject matter		Unit	First year		Second year	
			1st half	2nd half	1st half	2nd half
Philosophy	2	2	..	..	..	..
Sociology	2	2	..	..	..	..
Literature	2	2	..	..	..	..
Economics	2	2	..	..	..	..
Law	2	2	..	..	..	..
English language	8	2	2	2	2	2
Physics	2	2	..	..	..	..
Chemistry	2	..	2	..	..	..
Mathematics	2	2	..	..	..	..
Botanical Science	2	2	..	..	..	..
Breeding of Seeds	2	..	2	..	..	..
Agri. Meteorology	2	2	..	..	..	..
Agri. Chemicals	2	..	2	..	..	..
Gen. Agri. Science	2	2	..	..	..	..
SUB-TOTAL	34	20	10	2	2	2

31.2. Practical study is rather intensive and has a total of 112 units spread over two years between the various subjects as shown below :—

B. Curriculum for Practical Studies and Experiments

Branch	Subject matter	Unit	First year				Second year			
			1st half lessons	1st half experi- ments	2nd half lessons	2nd half experi- ments	1st half lessons	1st half experi- ments	2nd half lessons	2nd half experi- ments
Crop	Common crops	10	2	1	2	1	2	..	2	
	Special crops	1	..	..	..	..	..	..	1	
	Tea	3	..	..	..	..	1	1	1	
Horticulture	Green vegetables	6	2	1	2	1	..	..	..	
	Green vegetables growing out of season	2	..	..	..	..	1	..	1	
	Fruit trees	3	..	..	..	..	1	1/2	1	1/2
Agri. Che- mistry.	Soil	4	2	..	2	..	..	..	..	
	Fertilizer	6	2	..	2	..	1	..	1	
Crop Pro- tection.		4	1	..	1	..	1	..	1	
		4	1	..	1	..	1	..	1	
Crop Pro- duction.	Agri. Economics	2	..	..	2	..	..	..	..	
	Agri. Management	4	..	..	2	..	3	..	1	
	Farm Statistics	1	..	..	..	..	..	..	1	
	Agri. Admn.	2	..	..	..	..	1	..	1	
	Cooperatives	1	..	..	..	..	1	..	..	
	Agri. Insurance	1	..	..	..	..	1	..	..	
	Agri. Book-keeping	1	..	..	..	..	1	..	..	
	Agri. Law	1	..	..	..	..	1	..	..	
Agri. Engineering.	Farm Machinery	4	..	..	..	..	2	1	1	
	Utilisation of Domestic Animals	4	1	..	2	1	..	..	..	
	Rural electri- fication	1	..	..	..	..	1	1	..	
	Surveying	1	..	..	..	..	1	..	..	
	Agri. Engineering	1	..	..	..	..	1	..	..	
Village Industry.	Farm Product processing	3	..	..	..	..	1	1/2	1	1/2
	Dairy Industries	1	..	..	..	..	1	..	..	
	Rural supplemen- tary occupation	1	..	..	..	..	..	..	1	
Livestock	Livestock	2	..	..	2	..	..	..	..	
	Animal Husbandry	4	..	..	..	..	2	1	1	
	Veterinary science	3	..	..	..	..	1	..	1	1
Forestry	Forestry	1	..	..	..	..	..	..	1	
Sericulture	General seri- culture	1	..	..	..	..	..	..	1	

Branch	Subject matter	Unit	First year				Second year			
			1st half		2nd half		1st half		2nd half	
			lessons	experi- ments	lessons	experi- ments	lessons	experi- ments	lessons	experi- ments
Extension.	Rural Sociology	2	..	..	2	..	..	..	..	..
	Villager's training	1	..	..	..	1	..	..	..	..
	Extension theory	1	1	..	..	..	..	..	..	..
	History of extension work	1	..	..	1	..	..	..	..	..
	History of Agri. Technique	1	..	..	1	..	..	..	..	..
	Technique of Extension work	2	..	..	..	1	..	..	1	..
	Livelihood improvement	1	..	..	..	..	..	..	1	..
	Youth Organisation	1	..	..	1	..	..	..	..	..
	SUB-TOTAL	93	12	2	21	3	26	4	23	2
Experiments and Exercise.	..	2	..	1	..	1	..	..	..	..
Practical Training.	..	6	..	4	..	1	..	..	..	..
Farm Training.	..	3	..	1	..	1	..	1	..	..
Specialised Training.	..	8	..	..	..	..	..	5	..	..
	SUB-TOTAL	19	..	6	..	3	..	6	11	..
	TOTAL-CURRICULAM	112	12	8	21	6	26	10	23	..

32. *Fields of Social activities*—A recent follow up survey of 535 graduates turned out by the Institute revealed that they are spread out in the various sectors of the economy. The largest number are owner farmers accounting for nearly 40 per cent of the total. Of the remaining 60 per cent, 13 per cent are employed in co-operative department agricultural extension absorbs 9 per cent and prefectural government employs another 7 per cent.

Full details can be seen from the table below :

Employing Agency	Number	Percentage
Central Government	2	0.4
National Agr. Expansion Station	1	0.2
Food Control Office	10	2.0
Farm Statistics Office	25	4.7
Post Office, Police, Rly. Stations	6	1.1

<i>Employing Agency</i>		<i>Number</i>	<i>Percentage</i>
Monopoly Corporation	.. ..	3	0.6
Prefectural Government	.. ..	35	6.5
Pref. Agri. Exp. Stations	.. ..	31	5.8
Local Office (Admin.)	.. ..	20	3.7
Local Autonomous bodies (town or village offices)	.. ..	34	6.3
Agri. Extension Service	.. ..	48	9.0
Agri. High School Teachers	.. ..	2	0.4
Middle School Teachers	.. ..	11	2.1
Primary School Teachers	.. ..	2	0.4
Agri. Co-operative Staff	.. ..	69	12.9
Advanced study	.. ..	2	0.4
Owner farmers	.. ..	218	40.4
Commerce and Industry	.. ..	16	3.0
TOTAL		535	100.0

(iv) AGRICULTURE EDUCATION, RESEARCH AND
ADVISORY WORK IN THE NETHERLANDS.

(The material has been extracted from "Facts about Dutch Agriculture", 1952, "A survey of Agricultural Extension in the Netherlands" compiled in 1953 and published by the Ministry of Agriculture, Fisheries and Food—Publication No. E.62. and "A Survey of the Agricultural Advisory Service in the Netherlands" compiled in 1955 and published by the Ministry, of Agriculture, Fisheries and Food—Publication No. F. 114.)

1.1. *Brief survey of the Agricultural situation*—The total area of the Netherlands is approximately 9 million acres. Of this, agriculture utilises about 6 million acres—3.3 million acres under permanent and temporary grass, 2.3 million acres under tillage and 0.3 million acres under horticulture. Forests and woodland occupy 0.6 million acres and wasteland accounts for 0.6 million acres.

1.2. The Netherlands is the most densely populated country in Europe. There are 180 persons for 100 acres of cultivated area. In 1950 there were nearly 2 lakh farmers and 40,000 horticulturists. Small holdings predominate; about 60 per cent of the farms are between 2½ and 25 acres, nearly 40 per cent of the horticultural holding being smaller than 2½ acres.

1.3. The average area of cultivated land utilised per occupier (those whose main income is derived from the land) is 22 acres. If the agricultural workers and those who pursue farming or horticulture as a side line are also counted as occupiers, the average area per occupier is 16 acres. The available labour force on these small farms is usually large, and therefore the development of small holdings engaged in intensive farming, and producing animal products of a high value is well adapted to the conditions prevailing in Dutch agriculture.

2. *Government activities*—The development of agriculture in the Netherlands owes a great deal to research, education and advisory work. These facilities are the foundations on which intensive agriculture and horticulture have been built. Research, education and advisory work are mainly the concern of the Ministry of Agriculture, Fisheries and Food, though a close co-operation with the agricultural organisations is maintained. Although attempts were made to segregate agricultural education from the Ministry of Agriculture and transfer it to the Ministry of Education, it was realised that agricultural Extension would lose in intensity by such a change. Agricultural education thus continues to be the responsibility of the Ministry of Agriculture.

3.1. *Agricultural Education*—Of the trinity agricultural education, agricultural Extension and agricultural research the former is the oldest component.

3.2. Agricultural education dates back to 1815 when prospective clergymen had to undergo a training in agronomy to enable them to disseminate the knowledge they had gained among parishioners. Due to lack of interest shown by them the results were disappointing. Since 1840 Professor Van Hall taught agronomy not only to students but also to farmers and teachers at the school of agricultural economics at Groningen. This institution was wound up in 1871. Attempts were also made to involve school teachers in agricultural education. In 1857 a new act on Elementary education was passed which provided for the opportunity to do so. Yet it did not provide for a training of teachers in agriculture.

3.3. The interest shown in qualifying for teaching agricultural subjects being extremely moderate at first, grew as soon as prospects were opened to qualified men to be appointed as itinerant teachers. Some of the Agricultural Societies began to appoint such a functionary who read papers to farmers.

3.4. The serious depression menacing agriculture in the Netherlands from 1877 to 1895 induced the Government to sponsor agricultural education, agricultural research and agricultural extension in conformity with the recommendations made by the Royal Committee of 1888. They took the view that in the first place good agricultural education should become available, as farmers who have gone through a proper educational training in agricultural were more open to advice. A start was made with highly advanced agricultural education. Those who have gone through such a training are best suited to :—

- (1) Train the teaching-staff for primary agricultural and horticultural education;
- (2) to collaborate in agricultural research; and
- (3) to render advice to farmers.

3.5. The first Government agricultural teacher was appointed in 1890 and the first Government horticultural teacher in 1895. The agricultural teachers had a very comprehensive task; they rendered advice on all enterprises of husbandry, be it arable or livestock farming. As to dairying, special Dairy Advisers were appointed. The Agricultural teachers, later on being given the title of Agricultural Advisers, were relieved from their task with regard to livestock farming, when Livestock-Advisers were appointed.

3.6. The first agricultural winter schools were established in 1893. During the subsequent years secondary agricultural schools were founded. On a foundation derived from general agricultural courses of which some 1,400 are run each year the primary agricultural school was evolved in 1922. There are now nearly 200 such schools besides 4 agricultural vocational schools for dairy workers and 3 for the training of flax dressers. Including the students enrolled in the Agricultural University College the total number of pupils in the agricultural educational institutions is over 40,000. The total number of pupils attending horticultural schools is approximately 19,000.

3.7. *Present Position*—The following paragraphs give a brief account of the present (1955) position of agricultural education.

3.8. *University Education*—The Agricultural University College provides University education—5 to 6 year's course including six months of practical training. About 1,000 students are enrolled. After the intermediate examination the curriculum is split up into 5 branches, offering the opportunity to specialize in:—

1. Agriculture in the temperate regions with facilities for further specialization in arable and grass land farming, livestock farming, dairying, agricultural economics and drainage and reclamation of land.
2. Agriculture in the tropics with facilities for specialization in tropical crop farming, livestock farming and agricultural economics.
3. Horticulture with facilities for specialization in the culture of horticultural crops and crop improvement, and garden and landscape architecture.
4. Forestry in the temperate regions.
5. Forestry in the tropics.

3.9. *Secondary agricultural education*—There are 4 secondary agricultural schools one of them for training in tropical agriculture. The other schools are for those who want to take up farming in the temperate regions. These schools also aim at a proper all-round education of the pupils. Besides there are 2 secondary dairy schools intended for those who want to be trained for taking up managerial positions in dairy factories.

3.10. For sons of farmers, already working on a farm, there are opportunities to widen their theoretical knowledge and all-round knowledge by attending an agricultural winter school during two consecutive winters. There are 41 of such schools. Also the Netherlands Health Reclamation Society runs educational courses. There have recently been reorganized and there are now two schools which provide training in forestry and land development. In one of them the instruction is of a more advanced standard.

3.11. *Primary agricultural education*—The primary agricultural schools are founded by local or national agricultural organizations, and are subsidized by the Government. Their objective is to equip young prospective farmers and agricultural workers with fundamental all-round and technical knowledge and a course runs over a period of 4 years. As the pupils are also working on farms, the courses are only held for one or one and a half days each week. At present there are 209 primary agricultural schools. Preparations are being made to establish special trade schools for agricultural workers.

3.12. *Incidental courses*—Incidental courses are popular and have become numerous. In addition to courses in general agriculture at which lessons are given by school teachers with a special diploma in agriculture, there are courses in animal husbandry, hygienics of livestock and livestock obstetrics, livestock nutrition, horse shoeing, poultry farming, small livestock farming, milk recording, livestock housing, co-operative organization and management, soil productivity, farm management, engineering, agricultural machinery and milking.

3.13. *Horticultural education*—Horticultural Education is organized almost on the same lines as Agricultural Education.

3.14. University education is only available at the Agricultural University College at Wageningen.

3.15. There are two secondary horticultural schools, one (at Frederiksoord) being based on a very broad footing, the curriculum being focused on practice, and the other (at Utrecht) specializing more particularly in teaching economics.

3.16. There are 8 horticultural (winter) schools comparable to the agricultural winter schools. These vary their training according to the most important branches of horticulture of the district where they are situated. In addition there is one horticultural school for girls. Most of these schools provide for 3 years' training. Primary tuition is supplied by 56 primary horticultural schools, and at general horticultural courses (evening classes). In addition there are horticultural trade schools, attended by older pupils who already hold a diploma of general course or horticultural school. Here the pupils are trained in special subjects as is the case at courses for adults. At such courses, of a relatively short duration, generally only one subject is taught.

3.17. *Survey of Institutions and number of pupils 1951-52.*

				Number of institutions	Number of pupils
<i>University agricultural education</i>					
Agricultural university college	..	..	..	1	1,002
<i>Secondary agricultural education</i>					
Secondary agricultural schools	..	..	..	3	344
Government Secondary schools for agriculture in the tropics	..	..	..	1	294
Secondary dairy schools	..	..	..	2	147
Agricultural winter schools	..	..	..	41	2,773
Courses of the Netherlands Health Reclamation Society	..	..	..	1	83
<i>Primary agricultural education</i>					
Primary agricultural schools	..	..	..	209	16,129
Agricultural trade schools	..	..	..	4	151
General and specialized Agricultural courses	..	..	..	1,474	18,643
<i>Secondary horticultural education</i>					
Secondary horticultural schools	..	..	..	2	95
Horticultural winter schools	..	..	..	8	557
Horticultural school for girls	..	..	..	1	69
<i>Primary horticultural education</i>					
Primary horticultural schools	..	..	..	54	3,462
Horticultural trade schools	..	..	..	54	1,160
General and specialized horticultural courses	..	..	..	751	11,074
Training courses for teachers	..	..	..	26	497

3.18. The instruction in the agricultural and horticultural elementary and winter schools is mainly intended to teach future farmers and market gardeners some theoretical knowledge of agriculture and horticulture and to give them at the same time further general education. The local farming methods are of importance in designing the pattern of the instruction at each school.

3.19. A major part of the institutions are run by the voluntary farmers' organizations, partly denominational of nature though they are financed and supervised in regard to the technical programme by the department of Agriculture. A measure of the extensive agricultural education is the fact that some 50,000 male youngsters are now annually attending classes in agriculture or horticulture at some level as compared to a total of about 2,50,000 holdings in the country. This means that about 90 per cent of the future farmers get vocational teaching.

3.20. An interesting feature is that the headmaster of the schools teaches 5 days in a week; on the sixth day and during holidays he visits the farms owned by his pupils' parents. In this way he has an opportunity of keeping himself abreast with the practical side of farming which services as a guide for the instruction needed. Besides, these visits give him an opportunity to give advice where necessary. These headmasters, therefore, not only provide the instruction, but also act as agricultural and horticultural advisers.

3.21. *Link with advisory work*—In order to maintain a close link between education and advisory work, the agricultural advisers and their subordinate agronomists teach certain subjects at the agricultural winter schools. This enables them to establish contact with future farmers even whilst the farm boys attend classes. Similarly, the teaching staff of the agricultural winter schools are engaged on advisory work during the summer months.

4.1. *Agricultural Research*—Agricultural research which started with the first agricultural experiment station in 1877 has shown a vigorous development particularly in the post-war years. Today agricultural research is carried on by:—

- (a) The Agricultural University College at Wageningen.
- (b) A number of institutes and experimental stations.
- (c) Officers of the advisory services for agriculture, horticulture and livestock farming.
- (d) Special Committees, working teams, etc.

4.2. Except much fundamental research which is conducted at the laboratories of the Agricultural University College at Wageningen research is mainly focussed on problems which are today of outstanding importance to Dutch agriculture. Such applied research is conducted in a large number of institutes and experimental stations run by the Ministry of Agriculture. A considerable number of these is located at Wageningen or in its neighbourhood.

4.3. Apart from these, there are still numerous research institutions which are confined to research in regard to specific crops, being financed by the government in collaboration with private interests, e.g., the Netherlands Flax Institute, the Experimental and Research Station for the processing of straw etc. Besides there are privately run institutions of research

like the Institute of Rational Sugar Production and the Institute of Modern Livestock Nutrition, the Crop Improvement Farm of the Roman Catholic Co-operative Society.

4.4. The Government institutions are administratively under the Ministry of Agriculture, Fisheries and Food. The Ministry, however, is advised by a Committee, appointed for each of the government establishments, on the scientific programmes and budgets.

4.5. The central institutions mentioned above have a national task. Supplementary regional research which is essential to verify the results attained with local conditions is conducted in about 60 experimental farms and 40 experimental horticultural gardens located in different regions. The officers of the Agricultural Advisory Service also, to a certain extent, conduct regional investigations on experimental farms.

4.6. The organisation of Applied Scientific Research, established in 1943, co-ordinates the research work carried out at various institutions. Its task is to promote that applied scientific research is efficiently adopted to the interests of agriculture. The organisation has been granted a subsidy by the government and receives funds from the agricultural organisations. The research carried out at the Agricultural University College at Wageningen and at the Veterinary Faculty of the State University at Utrecht does not come within the scope of this organisation.

4.7. About 500 qualified research workers and 1,500 technicians were engaged in 1956 in agricultural research, of whom nearly 700 were working in the laboratories and institutes located at Wageningen.

4.8. There is a close contact between agricultural research and advisory work. It is realised that the results of research should be disseminated among practical farmers and growers as quickly as possible. It is equally important that the research workers should be seized of the problems arising in practice which the Advisory service is continually faced with. The following paragraphs give a brief description of the organisation of advisory work.

5.1. *Agricultural advisory work*—Apart from some divisions occupied in general affairs under direct management of the Secretary-General, the Ministry of Agriculture is divided into 4 Departments,

- (1) The Department of Agriculture.
- (2) The Department of Food.
- (3) The Department of Fisheries.
- (4) The Department of International organisation.

The Departments of Agriculture and Food are much bigger than the other two. The Department of Food deals with matters concerning prices of commodities, direction of production and marketing, etc. Regulatory and control measures are not concern of the Advisory Service. This has contributed to the establishment of good relationship between the members of the Advisory Service and the farmers.

5.2. The Department of Agriculture comprises 14 divisions. Of these the following take more particularly an interest in advisory work to farmers and growers:—

Arable and pastoral farming with Government Agricultural Advisers stationed in all provinces.

Livestock Farming with Government Livestock Advisers stationed in all provinces.

Dairying with Dairy Advisers stationed in most of the provinces.

Horticulture and Horticultural Education with Horticultural Advisers stationed all over the country.

(The Division of Agricultural Education is not concerned with Advisory work).

To a lesser extent the Divisions of Veterinary Officers, Land improvement and reallocation, Land tenure, Foreign Agricultural Recovery also take an interest in Advisory work. Each of these divisions also look after a part of agricultural research as far as it concerns its sphere of activities.

5.3. The Agricultural Advisers of the Divisions of Arable and grassland Farming and the Horticultural Advisers have a much more elaborate task than Advisers of other Divisions. The advisory work carried out by the Division of Arable and grassland Farming is reviewed below in considerable detail.

5.4. The Director of this Division is assisted by 5 Controllers of Agriculture:

- (a) One directing research;
- (b) One Superintending the advisory work;
- (c) One in charge of the work relating to grassland and fodder crops;
- (d) One dealing with the problems relating to arable farming;
- (e) One dealing with the farm economic problems.

5.5. For advisory work by the agricultural advisers the country is divided into several regions each with an Advisory Officer. The extent of the advisory region varies according to the province but, on an average, covers about 2,25,000 acres of grass and arable land comprising 6,500 to 7,000 farms of more than 7.5 acres (3 hectares).

5.6. Apart from their advisory work the advisers perform some research work, mostly of a simple nature, in experimental farms and fields. For this work they are assisted by an agronomist who is usually a graduate of the university college.

5.7. Every chief adviser with a region of a normal size is assisted by one or more specialised agricultural experts, 4 chief assistants (Associate Advisers), 22 assistants (Assistant Advisers) and some teachers of agricultural winter schools besides the necessary administrative staff.

5.8. The chief assistant Adviser has to supervise and control the work of the assistants. The 4 chief assistants are all given a special task either: (a) the management of experimental fields, (b) grassland and fodder crops, (c) arable crops, or (d) farm economic matters.

5.9. Of the 22 assistants 4 are given a special task involving the whole advisory region (experimental fields, soil testing and manuring, machinery, plant diseases), but the other assistants are allotted special district of 3 to 400 farms (over 3 hă—7.5 acres in size) covering a total of 4,500 to 5,000 ha (111 to 124,000 acres) of arable and grass land.

5.10. A schematic sketch of the position is as follows :—

Chief assistant Advisor Administration	Adviser Agronomist 2. Chief assistants	Teachers 2. Chief assistants
	(a) arable farming (b) grassland and fodder crops.	(a) Experimental fields. (b) farm economics.
3 assistants for general work.	18 district assistants.	1 assistant for general work
(a) agricultural machinery. (b) soil testing. (c) plant diseases and pests.		experimental fields.

5.11. Apart from the Government Agricultural Advisers who have a specific region allotted to them, there are few Agricultural Advisers, covering the whole country in the performance of a specific task. There are specialized Agricultural Advisers for machinery and mechanisation, utilisation of labour, construction of farm buildings, fibre crops, grassland management, plant diseases and pests, soil and manurial problems, and small holders' problems. The Agricultural Advisers in general service are also assisted by an agronomist and either one chief assistant or one assistant. The specialisation referred to concerns subjects requiring much research and specific enlightenment of farmers. The advisers must also see to it that they keep the staff of the advisers in the regions properly informed on the specific subjects under their care.

5.12. The organization of the Advisory Services under the direction of the Horticultural Division is slightly different from the one described for arable and pastoral farming. The horticultural advisers are usually at the same time the principal of a horticultural winter school and of an experimental garden (in many cases equipped with an unpretentious laboratory) to ensure a close contact between education, extension and research. Before 1940 the Advisers of the Division Arable and Pastoral Farming were also principal of agricultural winter schools. As both the activities ensuring from advisory work and education (due to a substantial increase in the number of pupils) made many demands on the energy of one managing hand, a division of the task was decided upon. The Agricultural advisers, however, are still teaching subjects for a few hours weekly at agricultural winter schools and the full time teachers at these schools are as far as possible involved in advisory work particularly during summer. The advantage accruing from this practice are:—

- (1) that the pupils are taught by teachers who are regularly keeping in close touch with practical farming;
- (2) that the advisers have the opportunity to establish a good contact with prospective farmers and growers in their region.

5.13. Most of the Agricultural and Horticultural advisers are charged with the Supervision of the primary Agricultural and horticultural schools and the agricultural and horticultural courses in their region and also with the training of the teaching staff of these schools and courses.

5.14. The advisers of the *Livestock Division and Poultry Division* render advice on breeding and tending of livestock and poultry.

5.15. The advisers of the *Land Tenure Division* render advice on and supervise the observation of statutory provisions on land tenure. They advise the "Land Chambers" on rents charged and other conditions laid down in leases.

5.16. The Division of Veterinary Affairs and Crop Protection Affairs are mostly concerned with enforcement of regulatory provisions. Direct advice to farmers is rendered through the livestock and agricultural advisers.

5.17. Because of the relatively large number of Assistant Advisers compared to the number of farmers, the Assistant Adviser who is the actual local agricultural adviser has been able to develop a rather intensive system of individual advisory methods, more especially farm visits.

5.18. The following table shows the growth of service between 1910 and 1955 :—

	1910	1930	1940	1950	1955
<i>Arable and Grassland Framing Advisory Service</i>					
Principal advisers	15	24	23	36	38
Associate advisers	—	—	9	30	40
Assistant advisers	—	3	234	649	723
<i>Livestock Advisory Service</i>					
Principal adviser	2	11	11	12	16
Associate advisers	—	1	2	8	10
Assistant advisers	—	4	11	17	26
<i>Poultry Advisory Service</i>					
Principal advisers	—	1	4	6	6
Associate advisers	—	2	—	—	2
Assistant advisers	—	4	—	22	28
<i>Dairy Advisory Service</i>					
Principal advisers	12	9	9	12	12
Associate advisers	—	—	—	4	12
Assistant advisers	—	5	7	16	42
<i>Horticultural Advisory Service</i>					
Principal advisers	12	19	22	27	28
Associate advisers	3	1	—	15	26
Teachers in General service	—	—	—	19	29
Assistant advisers	—	13	49	264	277
<i>Land Tenure Advisory Service</i>					
Principal advisers	—	—	—	10	10
Associate advisers	—	—	—	3	1
Assistant advisers	—	—	—	40	50
TOTAL ADVISORY STAFF	44	97	381	1,190	1,381

5.19. The Agricultural Advisers of the division of Arable and grassland farming and the Horticultural Advisers have a much more elaborate task than the Advisers of other divisions. While the Livestock and Dairy Advisers have to deal with one single enterprise of husbandry the agricultural and horticultural advisers have not only to consider the various enterprises of one farm or one holding but also the farm or holding as a unit when rendering advice. The agricultural and horticultural advisers are accordingly charged with farm economic advisory work and also with measures for

rationalisation of small holdings which are very numerous. As to the Live-stock Advisory Service and still more in regard to the Dairy Advisory Service private farmers' societies and agencies are carrying out a major part of the advisory work themselves.

5.20. *Tasks allotted to the Advisory Service*—The service is concerned only with farming technique and farm economics. In the latter task it works in close collaboration with the National Institute of Agricultural Economics. The Institute has delegated to most of the Agricultural Advisory Stations in the country one or two administrative workers, who arrange the collection and the preliminary elaboration of the farm economic data of a number of farms in the regions of these stations.

5.21. One of the important duties of the Advisory Service is to assist in the rationalisation of small holdings of which there are many. Government grant subsidies to those farmers who are prepared to introduce improvements in their farms, in co-operation with the Advisers concerned. The objective is to induce small farmers, who are generally reluctant to introduce improvements, to elevate their small holdings to the level of well managed farms. They are granted some compensation for the extra labour and extra expenses involved.

5.22. As stated earlier the Advisory service is not in charge of statutory measures, inspection of crops grown for seed and other provisions which are likely to impair the confidence of farmers in the service.

5.23. *Relationship with agricultural education and agricultural research*—The service maintains close relationship with agricultural education and agricultural research. The extent of such relationship with education has been explained earlier.

5.24. As to basic research carried out at the university, no relationships exist with the advisory services. Applied research carried out at several institutions is affiliated with the advisory services, e.g., by advisory specialists located at these central institutions who act as liaison between them and the regional advisory services. Besides, the institutions detach research workers in the field to carry out regional experimentation with the advisory services. The advisory service also plays an important role in planning programmes for applied research institutions and in carrying out themselves regional experiment work.

5.25. The departmental division for arable and grassland farming supervises or co-operates in the conduct of 20 experimental farms in which the advisory service is engaged intensively, a few of the regional principal agricultural advisers being even directors of such a farm.

5.26. Many so-called test farms are used by the agricultural advisory service to test the long-term effect of certain basic farm enterprises on the physical and financial aspects of the farm as a whole, such as for instance by farming, mechanised farming on small holdings, extensive dressing of nitrogeous fertilizers on grassland, rational feeding. Furthermore, a great number of field tests are carried on by the agricultural advisory service, more than 2,000 of them being conducted annually; nearly half of which bring so-called interprovincial tests planned by a committee consisting of representatives of both the central agricultural research institutes and the advisory service.

5.27. An academic trained associate adviser trained under the supervision of a superintendent for agricultural research attached to the division for arable and grassland farming is assisting each of the 26 regional principal agricultural advisers in co-ordinating experimental work in their respective regions. Finally in certain districts research workers of the central research institutes are working in close collaboration with the regional advisory services. In regard to farm economics personnel of the Central Agricultural Economics Research Institute is attached to the regional agricultural advisory offices.

5.28. The provincial livestock advisers are conducting feed and litter testing in their region with the aid of litter testing stations and provincial livestock feeding offices. Together with the provincial dairy advisers they are engaged in the milk recording scheme and also carry out experiments on the quality of milk.

5.29. As to horticulture there are very close relation between advisory work and research from the organization point of view. In many cases the principal horticultural advisers is director of the 40 experimental gardens of which 8 have even developed as regional centres of horticultural research, supervises and co-ordinates agricultural research.

5.30. In order to ensure a closer co-ordination in regional research work and to stimulate a stronger co-operation with and support from the agricultural industry provincial agricultural research centres are to be set up by the provincial councils for advisory work in which the advisory services and horticultural industry will be represented.

5.31. Finally, advisory specialists at the national and regional level are forming a two way traffic between research workers at the central institutes and the advisory workers in the field, who render advice to farmers and growers directly. In the division for arable and grassland farming there are 12 advisory specialists at the national level, often located at the respective central research institutes to 26 regional principal agricultural advisers. Besides each of the latter employs 8 specialized assistant advisers and sometimes teachers of the agricultural winter schools at the regional level being regularly trained by the respective advisory specialists on the national level to 16 all-round assistant advisers, who are acting as the local agricultural officers. In horticulture there are 9 advisory specialists, including 2 apiary specialists, to 18 regional principal horticultural advisers, the latter employing also teachers and assistant advisers who are mostly specialized in a special branch of horticulture. In the division for livestock husbandry there are 5 advisory specialists at the national level, to 11 provincial livestock advisers and 6 regional poultry advisers, the latter supervised and co-ordinated by a superintendent for poultry husbandry.

5.32. In order to establish an effective co-ordination in advisory work and to create in the meantime an intensive co-operation with the representative organizations of farmers and farm labourers in 1953 a national council for agricultural advisory work was founded by the Ministry of Agriculture to discuss and advise about advisory work in the broadest sense.

5.33. *Methods applied in Extensions*—Both the collective Extension method involving advice to groups of farmers and individual advice to farmers are employed. The former method consists of demonstrations, lectures with the aid of films and lantern slides, discussions in groups, wireless talks, etc. As the task of the Adviser is very broadening he has very

little time left for rendering individual advice to farmers. This kind of advisory work is therefore, mainly left to the district assistants.

5.34. Since 1930 the farmers have established Associations for co-operative advisory work which occupy themselves exclusively with rationalisation of farm management. They pursue neither political nor religious aims, and any farmer can join. The Agricultural Advisory Service sponsors the inception of such associations for the following reasons:—

- (a) it results in a selection of those farmers who show a keen interest in the rationalisation of their holdings with whom the Agricultural Advisory Service can co-operate successfully;
- (b) it is much easier for the Advisory Service to deal with one association in each village than with several agricultural organisations, as are to be found in most places of the Netherlands.

5.35. On January 1, 1953 there were 179 of such associations for co-operative advisory work with a total membership of about 30,000; the number of associations and of members shows a gradual increase.

5.36. The Agricultural Advisory Service is now deploying the district assistants in the first place to enlighten the members of these associations for co-operative advisory work. For that reason these assistants are as much as possible assigned such associations today.

5.37. Practical experience has revealed that in diverse cases a district with 350 farms covering from 4,500 to 5,000 ha. is too large for one assistant if intensive enlightenment be ensured. The farmers like to be visited twice a year by the assistant, one in order to device the cropping and manuring scheme and one for drafting the feeding scheme for the livestock during the forth coming winter. In addition the assistants are consulted by farmers to tackle special problems, such as control of plant diseases and pests attacking the crops, manurial treatment of soils, etc.

The assistants have also to attend to enquiries on various subjects, in the granting of the subventions to small holdings etc. The visits to be paid to farms for these purposes require very much time, and consequently many assistants are quite unable to visit all farms twice a year.

5.38. On account of the limited funds available to the Ministry no more assistants, are being appointed. It is for this reason that farmers, if they wish ardently to be visited for individual enlightenment more frequently, will have to meet the extra expenses entailed from their own resources. Due to this several Associations for co-operative advisory work have now decided to appoint more assistants on their own account, the latter being incorporated in the ordinary staff of the Agricultural Adviser concerned. The members contribute 9.25 to 1.00 gld. per hectare annually the accumulated funds being used to meet the costs of specific publications, demonstrations, experimental field investigations, and payment of staff, the funds being complementary to those supplied by the Government.

5.39. A substantial part of individual advice rendered concerns manuring based on analyses of soil samples (in 1951 : 130,000). Nearly all these samples have been forwarded to the laboratory by the Advisory service on the request of farmers and growers, the Service devising the advice which is subsequently discussed with the farmer in person. Much individual advice is rendered at weekly consulting hours at the head office of the Advisory Station and on important market places, and also by letter or telephone.

5.40. *Recruitment and training*—Amongst a total staff of nearly 1,400 including the advisory specialists, the advisory services as an entity work with about 200 qualified agronomists; the principal and associate advisers are graduates of the Agricultural University at Wageningen. The majority, therefore, consists of more than 1,000 assistant advisers without a university training but mostly with a diploma of a secondary agricultural school or of a horticultural school or a diploma of a vocational teachers' school.

5.41. In view of the rather limited pre-service training of the assistant advisers much stress is laid on an "induction training" and "in-service training". The specialised assistant advisers follow an induction training of two years duration, whilst the in-service training is constantly carried out in regular meetings by the academic trained advisory specialists on the national level. The all-round local assistant advisers follow a 3 years induction training course, and also have regular meetings with the principal regional agricultural advisers and their specialized assistant advisers.

5.42. For the academically trained associate advisers and others partly engaged in advisory work, as for instance teachers of secondary vocational school, an induction training course of two years' duration has been planned in co-operation with the agricultural University. The principal advisers of the various advisory services meet regularly with the directors of the respective departmental divisions, which meetings are attended by the representatives of the institutions for agricultural research.

5.43. *Advisory work on home economics and rural youth work*—While the Agricultural Advisory Service, advising farmers mainly in regard to the technical and farm managerial side is accepted and supported by the farmers' organizations, the situation in regard to advisory work in home economics for the farmers' wives and rural youth advisory work as belonging to the social sphere and family life, is felt to be the concern of the voluntary organizations themselves, partly denominational of nature. The same applies to resident teaching. Resident teaching in rural home economics, started in 1913 with the first school, has developed strongly. At present more than 30,000 rural girls receive education at some 200 schools of home economics and numerous courses. Nearly 100 teachers graduate annually from 5 training schools for rural home economics. Unlike agricultural education rural home economics education is under the Ministry of Education. Since 1952 resident teaching in rural home economics is also given at the university level, a special division being erected at Wageningen. In 1955 a foundation for rural home economics has been erected at this centre, which will also carry out research work in this field.

5.44. Graduates from the rural home economics schools are becoming active members of the rural women's organizations, and seeking for more advice whereas the teachers often take the lead in rural women's work. Resident teaching in home economics has, undoubtedly, paved the way for the advisory work of the voluntary rural women's organizations, started in the late twenties, partly denominational, with, at present, a total membership of 100,000; and also for the work of the Home Economics Advisory Service established in 1935. The latter is financed mainly by the Ministry of Education; though rather limited in personnel, it extends its activities by establishing contacts with the women's organizations.

5.45. In the Board of the foundation consisting of representatives of the Government and rural organizations, rural women have their delegates. This Service reaches the rural women by adult courses in food preparation

and preservation, sewing, care of clothing and textiles and home management, that is to say in all technical subjects of home making. They are attended by more than 10,000 women annually. Subjects with a direct bearing on family life are left to the private organizations. The Rural Home Economics Advisory Service gives talks and demonstrations at meetings of the local branches of the rural women's organizations.

5.46. The rural women's organizations themselves are, however, the main body in rendering home economics advice. Numerous courses, meetings and demonstrations are organized by them. The 3 rural women's organizations are working together in some special demonstrational and visual aids programmes, through a recently established liaison committee. Unlike the work carried out by the agricultural advisory services individual methods and particularly farm visits play still a minor role in the home economics advisory work, due to lack of personnel.

5.47. There does not exist a co-operation between the agricultural advisory services and advisory work in the field of home economics.

5.48. As to rural youth work a major part of the institutions for resident teaching in agriculture are run by the voluntary farmers' organizations, partly denominational of nature though they are financed to a great extent and supervised in regard to the technical programme by the Department of Agriculture. As stated earlier 50,000 boys are annually attending these institutions at the various levels. Teachers of these institutions are dealing with farm youth advisory work. For the same reason as was mentioned in regard to home economics, advisory work for farm boys is mainly restricted to the rural youth organizations, with a membership totalling some 50,000 supported by the farmers' organizations. Project work is getting increasing attention in post-war years. On the national level the 3 rural youth organizations have established a liaison committee. Since 1952 they have established, together with the farmers' organizations a foundation for technical rural youth work to improve by a co-ordinated effort technical activities by means of directives, guides and regulations in this respect. Several thousands field trials, demonstrations and competitions are arranged annually under the auspices of this foundation. Personnel of the Government Agricultural Extension Services is getting engaged to some extent in these technical activities. But generally the agricultural advisory service almost exclusively dealing with adults, is not engaged in rural youth advisory work.

5.49. The social problems in the rural society, are arousing an increasing interest. A committee for rural welfare has been appointed by the Minister of Agriculture in 1954. This committee consists of several officials of the Department of Agriculture, experts and representatives of the organizations of farmers, farm women, agricultural labourers and their wives. This committee may stimulate measures to raise rural welfare by a co-ordinated effort of the agencies interested in this field.

6. *Expenditure*—Agricultural advisory work, resident teaching and research are in nearly equal amounts almost exclusively financed from treasury funds, totalling (1955) to about 1 per cent of the total value of the gross output in agriculture. The cost of the advisory services are on the average about 5 guilders per hectare cultivated land.

7. *Relationship of Advisory service and agricultural and horticultural organisations*—The Advisers maintain very close contact with the various

agricultural and horticultural organisations and provincial branches of the National Farmers' organisations. The Director of Horticulture is, as a rule, an advisory member of the councils of the National Horticultural organisations and the Adviser acts in the same capacity on the committees of the provincial branches. Similarly, the Advisers are usually advisory members of the provincial branches of the National Farmers' organisations.

8. *Conclusion*—The advancement made in Dutch farming are only partly due to the activities of the Advisory Service. Research and education have exerted a considerable influence. Similarly, the work of the Agricultural Organisations has had a very useful effect. The numerous field trials conducted by the service have made farmers well informed of the choice of varieties of the crops they grow. A better variety is now introduced within a few years. Better manurial treatment of land has become general practice due to soil testing and the good results obtained on demonstration plots of the Extension Service. In horticulture the service has been particularly successful in modernisation of fruit farming.

(v) *Agricultural Research, Extension and education in the United Kingdom*

(Based on 'The Agricultural Research Service' 1953 and 'Report on the National Agricultural Advisory Service 1955—published by the Ministry of Agriculture, Fisheries and Food, United Kingdom).

Brief survey of agricultural situation

1. About 80 per cent of the land area of the United Kingdom is used for agriculture—48 of the 60 million acres—and about 5 per cent approximately 14 million of Britain's working population, are engaged in it. It is estimated that there are about 300,000 full time farmers in Great Britain, and, in addition, about 50,000 part time or "hobby" farmers. Besides, there are nearly 700,000 farm workers.

2. Excluding rough grazing and holdings consisting solely of mountain and heathland, there were in 1956 just over 3,50,000 farms and holdings with over 5 acres of crops and grass, beside about 90,000 agricultural holdings of 5 acres or less. About 25 per cent of the holdings were 100 acres and over accounting for nearly 70 per cent of the agricultural area, 15 per cent were 50 to 100 acres, and about 40 per cent were 5 to 50 acres. The average size of the holdings was 68 acres in England and Wales and 61 acres in Scotland.

3. The types of farming carried on in Britain vary widely with the difference of soil and climate. In England and Wales, dairying predominates, for it is of substantial importance on nearly half the farms covering nearly half the cultivated area. In Scotland, there are three main branches of agriculture dependent upon the distinct character of the three areas. Arable cropping is carried on in the east, with the rearing and fattening of livestock as a complementary activity; in the South-West are the dairy counties, and in the North and North-West, land is used mostly for grazing of sheep and cattle and tilled in small holdings in the lower valleys. Northern Ireland is intensely cultivated in small farms, the principal crops grown being potatoes, oats, flax and ryegrass for seed.

4. The greater portion of the cultivated area is under grassland. The area under tillage increased from about 8.8 million acres in 1939 to nearly 11 million acres in 1957.

5. The gross value of the agricultural output increased from about 400 million pounds in 1940-41 to 1,340 million pounds in 1955-56. About 70 per cent of this is derived from livestock and livestock products.

6. *Role of Advisory Service in increasing production efficiency*—The British farmers who had achieved a high level of craftsmanship even before the impact of science is enable to strive for still higher levels of production efficiency thanks to a well organized Agricultural Advisory Service. The prime task of the Service is to sift the growing harvest of new knowledge and new resources and to commend to the individual farmer such new practices as he might, with advantage, adopt. The Advisory Service, with its Extension function, has on one flank the Research Centre and on the other the Agricultural Education Service of the Local Authorities. The following paragraphs describe in brief the organisational set up of agricultural research, advisory work and education :—

7. *General set up of the organisation for agriculture*—The Ministry of Agriculture and Fisheries and the Department of Agriculture for Scotland are concerned with Agricultural policy and development. The division of labour in the fields of research, advisory work and education is broadly as under:—

Research is co-ordinated by the Agricultural Research Council. The aim of the research service is to ensure that there is a full and steady flow of information from the research authorities and centres into the advisory service. The Agricultural Improvement Councils—one for England and Wales and one for Scotland—advise the Departments on the best means of quickly incorporating research results into farming practice; they also advise the Agricultural Research Council about problems which they think require investigation. The National Agricultural Advisory Service for England and Wales is the executive agency for giving technical advice and instructions to the farming community—other than in the fields of veterinary, farm buildings and farm management for which separate field services exist. (In Scotland the advisory service is provided by the three agricultural colleges). The Universities, the agricultural colleges and the Local Educational Authorities are responsible for agricultural education.

8.1. *Agricultural Research*—In its early days, agricultural research was not organised at all. It began by the action of individuals who, either alone or in associations, founded, and at first maintained, the older research institutes. New institutes were added subsequently. After some years, public subscriptions became inadequate to meet the enlarged scale of research, and Government funds were sought and obtained. There are now 20 such State aided institutions. The percentage of the expenses met from Government sources is now more than 90.

8.2. The expenditure on agricultural research in Great Britain increased from about 0.4 million pounds in 1940 to nearly 3 million pounds in 1951. Expressed as a percentage of the gross value of the agricultural output the expenditure on research rose from 0.1 per cent in 1941 to 0.3 per cent in 1951.

8.3. *Agricultural Research Council*—In the earlier years, the Development Commission was responsible for co-ordinating agricultural research. As agricultural research grew rapidly wider and more complex, and created new problems of co-ordination, the Agricultural Research Council was

set up in 1931 to advise the Agricultural Departments on the programmes of the Institutes, to act as scientific advisers to the Development Commission, and to expand at their own discretion the additional monies specially provided for research. When fully established, the Council gradually took over the responsibilities for agricultural research formerly discharged by the Development Commission.

8.4. One of the first acts of the Agricultural Research Council was to resurvey the Agricultural Research Institutes. It found that new research was desirable on several subjects. This required land, equipment and organization on an expensive scale and it was decided to set up entirely new stations to be financed and administered entirely by the Council. Four new institutes and a number of smaller research units dealing with various special subjects were thus set up.

8.5. *Agricultural Research in the University*—Agricultural research in the Universities began in the closing years of the nineteenth century, when private benefactions supplementing University funds enabled some Universities to found Departments of Agriculture. These University Departments also received Government support in the earlier years. Except for certain grants for specific purposes neither the Government Agricultural Departments nor the Agricultural Research Council now have to finance this research, which is planned and administered by the Universities themselves. The Universities and the Agricultural Research Council, however, work in close co-operation. The Research Units of the Council have in every instance been set up in association with universities, and most of them work under the direction of senior members of university staff.

8.6. *Agricultural Research Act*—The Agricultural Research Act which came into force on the 1st April, 1956, provided for the financing of agricultural research through a fund into which monies voted by Parliament were to be paid. The Research Council accounts direct to Parliament for expenditure from the fund. The new arrangement did not alter or modify the powers and responsibilities of the Council nor did it affect the status of the scientists employed directly by the council or by the Research Institutes in England and Wales. The research Institutes were to be supported by grants-in-aid from the Council. The council is responsible to the Lord President of the Council and is subject to such direction as may be given by a Committee of the Privy Council of which he is Chairman.

8.7. *Functions of the Agricultural Research Council*—The Agricultural Research Council reviews, co-ordinates and promotes new research, and ensures as far as possible that the scientific manpower and other resources available are used to the best advantage. It supervises the state-aided research institutes administers its own institutes and units, assists fundamental and applied research in the Universities and elsewhere by making special research grants for specific projects and trains recruits for the agricultural research service by awarding annually a number of research studentships and training grants to assist promising recruits in obtaining post-graduate experience and maintains liaison with Government Departments.

8.8. *Strength of the Scientific Staff*—The Agricultural Research Institutes employ a scientific staff of nearly 800 with a corresponding complement of experimental officers and scientific assistants (scientific officers are

recruited from University graduates). The details of the staff employed as on 1st April, 1957) are given below.

Scientific Officer Class

Chief Scientific Officers	..	..	6
Deputy Chief Scientific Officers	..	..	34
Senior Principal Scientific Officers	..	..	50
Principal Scientific Officers	..	..	186
Senior Scientific Officers	..	..	288
Scientific Officers	..	..	249
Total			813

Experimental Officer Class

Chief Experimental Officer	..	..	..	1
Senior Experimental Officers	..	..	..	48
Experimental Officers	..	..	..	213
Assistant Experimental Officers	..	..	..	304
TOTAL				566

Scientific Assistants Class

Senior Assistants	..	..	..	..	73
Assistants	..	..	..	..	659
					732

*Scales of Pay**

Chief Scientific Officer	..	..	..	2,900 or 3,150	(per annum)
Deputy Chief Scientific Officer	..	..	..	2,300 or 2,600	
Senior Principal Scientific Officer	..	..	..	1,900 or 2,200	
Principal Scientific Officer	..	..	..	1,295 — 1,850	
Senior Scientific Officer	..	..	..	1,075 — 1,265	
Scientific Officer	..	..	..	565 — 995	

9. Agricultural Advisory Service.

9.1. *Its origin and development*—The National Agricultural Advisory Service for England and Wales was set up by the Government on 1st October, 1946. Its function is to give "free of charge" technical advice and instruction, whether practical or scientific, on agricultural matters".

9.2. Prior to this date the functions of providing advice to farmers were shared by the County Councils and the Universities and agricultural colleges. With grants from the State the County Councils developed in varying degrees and at varying rates, a system of residential and part time instruction and of a general advisory service. This general county advisory service was supplemented by a provincial specialist service, provided by the Universities and agricultural colleges which, with the help of grants from the State, built up a specialist service over most of the country.

9.3. The Luxmore Committee on agricultural education and advisory services which reported in 1943 found many imperfections in the existing system. In the county service it criticised the lack of uniformity, the lack of central control, the poor opportunities of advancement, the general

*These scales are for men. Scales for women are slightly less. Equal pay for women is being introduced by instalments over a period of seven years.

inadequacy of staff and the insufficient use of the provincial services. Its main criticisms of the provincial service were of the lack of co-ordination with county activities, the inadequacy of physical facilities, insufficient familiarity with farming practice; and of the fact that there was some danger of divided loyalties (in the Universities and colleges) and lack of contact with other scientists.

9.4. The Committee recommended one advisory service for the whole country with the district—which should not be more than one thousand farms or a hundred thousand acres—as the primary unit in charge of a district advisory officer, the county as the next unit, with a general county officer and with county specialists, the specialists services continuing to be based on the province.

9.5. The establishment of the National Agricultural Advisory Service was based on this report. Agricultural education was, however, not made the responsibility of this service but continued to be the responsibility of Local Education Authorities.

9.6. This single national organisation now provides a free service of technical information to farmers, small-holders, horticulturists and their employees, under the general supervision of the Ministry of Agriculture and Fisheries. As a result of the unification of this service, the Ministry of Agriculture is able to give general direction and guidance on policy, as well as on the technical development of the industry, and can stimulate activity in any direction, or in any part of England and Wales where this seems desirable. A greater uniformity of the work throughout the country, and a better co-ordination of the work of the specialist with his field colleagues becomes possible when both officers are members of the same Service. The creation of a National Service also has the great advantage of providing better career prospects for the staff, and more uniform assistance to the different countries and branches of the industry.

9.7. *Responsibilities of the Service*—The responsibilities of the Advisory Service include :

- (a) The spreading of scientific and technical knowledge which can be used by food producers in increasing the efficiency of their business.
- (b) The provision of advice to individual farmers on the solution of their production problems.
- (c) The carrying out of such experiments and trials which provide the raw materials of extension in the local area and which will show how far new discoveries and inventions can be applied in the locality.
- (d) Bringing to the notice of agricultural research workers those of the farmers' problems which seem to require fundamental investigation.
- (e) Operation of various statutory and departmental schemes for the improvement of the standards of agricultural production, the most important being :—
 - (i) The inspection and licensing of bulls, boards and stallions with the object of preventing the use for breeding of inferior animals;

- (ii) The inspection of dairy farms in connection with the administration of milk regulations;
- (iii) The inspection and accreditation of breeding flocks of poultry;
- (iv) The inspection and certification of growing crops of potatoes, herbage plants and vegetables from which seed is to be harvested and of fruit bushes and root stocks which are to be sold for planting; and
- (v) The inspection of crops and plants under plant health regulations.

9.8 The Service is responsible not only for the technical but also for the economic aspect of advisory work in the districts. On the economic aspect of farm management the service is assisted by the staff of the Provincial Agricultural Economic Service, located in Universities and Agricultural Colleges, which is the main source of economic data on which farm management work must be based. Proper liaison is maintained by the appointment to the staff of each Provincial Agricultural Economist of a Senior Agricultural Economist, who will be fully engaged on farm management work and act as the liaison officer between the economists and the National Agricultural Advisory Service in his province.

9.9. Other matters on which the farmer may need advice but which are outside the responsibility of the N.A.A.S. are :—

- (1) *Animal Health*: All measures for the prevention, control and eradication of disease are the responsibility of the Ministry's Veterinary Service.
- (2) *Estate management*: The Ministry's Agricultural Land Service has the responsibility of promoting good estate management.

9.10. The N. A. A. S. has developed close working relations with these services. As both the Land and Veterinary Services have their regional and local organisation, co-operation can be maintained at all levels. This is further assisted by locating all these branches at one place.

9.11. The N.A.A.S. has similarly the closest connections with the Universities, Agricultural Colleges and Local Education Authorities who are responsible for agricultural education. Since the setting up of the Service the Universities and agricultural colleges have withdrawn from direct advisory work among farmers. The Service, of course, maintains the closest contact with research and higher education in order to maintain its technical standards. Working relationships have similarly been established between the Service and the Local Education Authorities under which the Advisory Service advises the Commercial producer while the Local Education Authorities are responsible for instruction, whether at farm institutes or extra murally, and also for advice to domestic producers.

9.12. *How the Service is organised*—In London there is a small head-quarter staff consisting of the Director of the Service, three Senior Advisory and Education Officers who are responsible for the Science, husbandry and horticulture groups respectively, and a few other technical officers. It is from here policy direction is given, but a fair degree of autonomy in the execution of that policy is left to the senior officers in the field.

9.13. The service is organised by Provinces, Counties and Districts. The sixty-two counties in England and Wales are divided into eight Provinces. The Advisory Headquarters is located at the Provincial Centre

which is equipped with a range of science laboratories, a library, meeting rooms and administrative offices. Most of the Provinces have at least one Experimental Husbandry Farm and some have an Experimental Horticulture Station in addition.

9.14. The staff at the Provincial centre is headed by the Provincial Director. It is his responsibility to provide leadership and co-ordinate the work of the Provincial Centre and the Counties. He serves on the selection boards for the recruitment of technical staff through the annual competition as well as the boards which the promotion of officers already in the service. He also acts as Vice-chairman of the advisory committee of the Experimental Husbandry Farm or Horticulture Station in the Province.

9.15. The Provincial Director is assisted by a Deputy and a number of specialist officers who are the chiefs of the various Departments located at the centre, viz. :—

Science Specialists	..	..	..	..	Soils and Plant Nutrition Animal Nutrition Entomology Plant Pathology Bacteriology
Husbandry Officers	..	..	..	..	Field crops Grassland Livestock Milk Production Poultry Husbandry Farm Machinery
Horticultural Officers	..	..	..	..	Fruits Vegetable crops Glass house crops Flowers.

9.16. *Science Specialists*—The functions of the Science Specialists may be divided into three broad categories : first, to help the officer in the field, second, to study the problems of the province by maintaining close contact with conditions on farmers' and growers' holdings : and third, to form a link with the research workers in research institutes, Universities and colleges so that their findings can be tried out and brought to the attention of the farmer. Each Science Specialist has a laboratory and the necessary staff which carries out appropriate investigations. As an example, the Soils Department carries out a very large number of soil analysis which provide the basis for advice on the use of fertilisers, and so on, on the farm. The Plant Pathologist deals with a large number of diseased plants—wheat, sugar beet, potatoes, clover, fruit twigs, etc.; and has the responsibility of diagnosing the disease and advising suitable treatment and of preventive measures for the future. It may happen, however, that many of the problems affecting crop and animal production require fuller and more lengthy investigation than the specialist is able to undertake. It then becomes a matter for the agricultural research service.

9.17 *Husbandry and Horticulture Officers*.—The Husbandry and Horticulture Officers have the dual role of consultants in their respective spheres, and in co-ordinating experiments and trials, supervising improvement scheme and in the most important task of keeping his field colleagues advised of new development in their particular branch of husbandry.

They form a link between research and practice. The emphasis and importance of any one aspect of a Husbandry Officer's work varies with the system of husbandry most common in his area. Similarly, the number of horticultural officers and the nature of their specialization depends on the type and extent of the horticulture practised in the province. The duties of the Husbandry and Horticulture Officers include statutory and advisory work arising out of the administration of regulations, e.g. Milk and Dairies Regulations, Crop certification, Statutory inspection of crops, etc.

9.18. *The County Staff*—At each county headquarters the Principal Officer, the County Agricultural Officer has at his disposal a number of field specialists, which generally include a few experienced agriculturists, one or more horticulturists, Livestock Husbandry Officers, a Poultry Officer and a Machine Officer. Naturally, the number and range of these County Specialists depend on the nature of the agricultural practices of the area and by the scale of statutory and inspectorial duties.

9.19. The Country is divided into a number of districts with an advisory officer in each district. The Luxmore Committee had proposed that each district should not exceed 1,000 farmers or 100,000 acres. While this is the general pattern adopted and the service is working towards this recommendation, there are considerable variations of that standard and some districts have up to 2,000 farmers or more.

9.20. *District Officer*—The District Advisory Officer is normally the first point of contact between the farmer and the advisory service. He is available on call to the farmer. The basis of his work is the individual farm visit. All the District Officers carry out some experimental or demonstrational work in their areas and they are also concerned with observation studies of local interest.

9.21. In the course of his work he naturally has to face problems covering a range wider than any one individual can possibly be expected to solve. If the trouble relates to milk production, fruit, or to subject for which there is a county specialist he may refer it to his colleague for an opinion. Should the difficulty defy local solution he will almost certainly draw upon the wider experience of the appropriate Provincial Specialist through whom the whole range of laboratory services becomes available for the analysis of soils, feeding stuffs, plant tissues, milk and many other items.

9.22. The great majority of the practical problems posed by the farmer yields to this combined attack, but occasionally it may happen that without more fundamental information the difficulty cannot wholly be resolved. In such cases the matter becomes the responsibility of the Provincial Specialist who either initiates further investigations in his own laboratory or on his field plots, or, if the need for further work at the research level is apparent, will hand over the problem to the appropriate Research or Experimental Station for treatment. However far he may have to go for a solution, the answer comes back to the District Officer and through him to his farmer client.

9.23. *Recruitment, training and salary of officers in the service*—The personnel of the service falls within three broad groups—the science specialists, the husbandry specialists and the field adviser.

9.24. The science specialists require a full training in fundamental science and the most usual academic training is an honours course in pure science. In an increasing number of cases, this is supplemented by a year's post-graduate work which gives the student a general knowledge of the bearing of science on agricultural practice, and leads to a Diploma in Agricultural Science.

9.25 The husbandry specialists are principally drawn from the rank of graduates in general agriculture and horticulture and many spend a number of years in the Service as District Officers before specialising. A growing proportion of the direct entrants spend a year or more in post-graduate study of their speciality—grassland, fruit production, animal husbandry, etc. It is essential that academic training must follow adequate practical experience.

9.26. Finally, there are the general advisers, who are normally University graduates in Agriculture or Horticulture. The course of training in both cases covers three years and are of a general nature, that is to say, the student is not encouraged to specialise.

9.27. The service comprises the following grades :

					(per annum)	
Provincial Director	..	..	..	2150	2400	
Deputy Provincial Director	..	..	..	1420	2000	plus allowance of 230.
Grade I	..	..	..	1340	1900	
Grade II	..	..	..	1220	1420	
Grade III	..	..	..	770	1216	
Grade IV(a)	..	..	..	565	760	

(These are the scales for staff at provincial centres. The scales for London and certain large towns are somewhat higher).

9.28. Recruitment to the Service is made through an annual competition held by the Civil Service Commission in March or April. Selection is by interview. Candidates who are sitting for their final examinations in the summer of the same year are admitted, but appointment depends upon their examination results.

9.29. Recruitment is normally made to Grade IV, although there are a few vacancies in some other grades which may be filled by candidates with considerable experience. Candidates with first or second class honours in the appropriate scientific subject, or an equivalent qualification, are appointed to Grade IV(a); others are appointed to Grade IV(b). The starting salary of a candidate who has carried out approved post-graduate research or training after reaching a level at which he would have been eligible for appointment, may be increased by £20—£30 for each of two years' post-graduate work. Successful candidates who have served full-time in H. M. Forces under the National Service Acts also have their starting pay increased by @ £20—£30 for each complete year of such service up to a maximum of two.

9.30. The whole series of posts from Grade IV to Director is regarded as a single service in which there are opportunities for promotion. Officers in Grade IV(a) are promoted to Grade III at the end of two years' satisfactory service and promotion from Grade IV(b) to Grade III takes place at any time after from two to five years' satisfactory service.

9.31. *In Service Training*.—After appointment the new officer serves a probationary period of two years; thereafter, if good progress has been made, his appointment is made permanent. Within a few months of his appointment he attends a New Entrants Course which provides him with information about the structure and organization of the Service which he has joined. He is instructed in the art of public speaking, on the best means of approach to the farmer, and on the use of advisory aids. Through his life as an adviser refresher courses of various kinds are provided so that his knowledge of current developments is kept up-to-date; he is encouraged to pay periodic visits to research stations and experimental farms in order to keep him in touch with such technical advances as are approaching the point of general application, by these and other means the Ministry helps to ensure that the National Agricultural Advisory Service is maintained at a high pitch of efficiency.

9.32. *Strength of the Service*.—The service had a total of some 1,500 advisory officers and a little over 200 junior laboratory staff in 1951. This figure has been more or less stabilised. The following table gives the position as in October, 1954.

NATIONAL AGRICULTURAL ADVISORY SERVICE OFFICERS IN POST
(as at 1st October, 1954)

Category				Officers in post
Senior H. Q. Officers	..	..	..	6
Provincial Directors	..	..	..	8
Deputy Provincial Directors	..	..	..	6
General Agriculture	..	..	..	455
Crop Husbandry	..	..	..	20
Grassland Husbandry	..	..	..	23
Farm Machinery	..	..	..	72
Livestock Husbandry	..	..	..	105
Milk Production	..	..	..	231
Poultry Husbandry	..	..	..	104
Advisory Aids	..	..	..	12
Horticulture	..	..	..	168
Analysts	..	..	..	30
Bacteriologists	..	..	..	30
Soil Chemists	..	..	..	79
Nutrition Chemists	..	..	..	22
Entomologists	..	..	..	74
Plant Pathologists	..	..	..	40
Experimental Husbandry Farms and Horticultural Stations	..	..	..	47
TOTAL				1,532

10. *Agricultural Education in England and Wales.*—(Agriculture for this purpose does not include forestry. Forestry education at the University level is given in the University College of North Wales, Bangor and at the University of Oxford, Imperial Forestry Institute. Veterinary education in the sense of training student as veterinary graduates is provided at the University level only. Four Universities give this education—University of London at the Royal Veterinary College, University of Liverpool, Faculty of Veterinary Science, University of Cambridge, School of Veterinary Medicine and the University of Bristol, School of Veterinary Science. The courses run from five to six years. Some instruction in animal disease and their treatment is given as part of general agricultural course).

10.1. The courses provided in respect of Agricultural and Horticultural education fall into three main groups; degree courses at universities, two year diploma courses at agricultural colleges and in certain County agricultural institutes and one year course and County agricultural and horticultural institutes. These include in varying degree agriculture, horticulture, dairying, animal husbandry, poultry husbandry, agricultural economics, farm management, co-operation etc. Some instruction in animal diseases and their treatment is given as part of general agricultural courses.

10.2. Degree courses are designed for intending farmers and growers and for students seeking professional employment, for example, advisory and teaching course. The two year diploma courses meet the needs of students, for the most part those who aiming at practical careers in the industry, require a training intermediate in standard between degree courses at universities and one year course at the County Institutes. The courses at the County Institutes provide a basic training for students aiming at work of special responsibility in agriculture or horticulture.

10.3. The minimum academic qualification for admission to a degree course at most universities is a General Certificate of Education. For diploma courses the General Certificate of Education at ordinary level is usually required while no formal academic qualification is normally required for admission to the County Institutes. Previous practical experience of at least a year on the lands is an essential qualification for entry to agricultural and horticultural courses at most universities and at all colleges and institutes.

10.4. Ten Universities offer both Graduate and Post-Graduate courses. Of these only two Universities, University of Nottingham and the University College of Wales, Aberystwyth, give courses below degree level, that is, diploma course in dairying. Courses leading to first degree usually take three or four years; post-graduate degrees one or two years. About 450 first degrees and post-graduate diplomas in agriculture and forestry are awarded annually at English and Welsh Universities. The graduates turned out by the Universities normally go in for teaching, research or advisory work, although, a few take up practical farming.

10.5. There are five agricultural colleges with about thousand students between them. The Colleges are independent foundations but some of them are receiving grants from the Ministry. They offer mainly two year courses and award their own diplomas in agriculture, dairying, horticulture, poultry husbandry, farm management or estate management. They

also prepare students for the National Diploma in Agriculture, Dairying, Horticulture and Poultry Husbandry. The great majority of the students complete the courses successfully. Most college students take up practical farming either as specialised work managers or on their own account. Some take posts with commercial firms and few enter advisory or teaching services. Based on the details of staff for four of the colleges the student staff ratio varies from $8\frac{1}{2} : 1$ to about $22 : 1$. Scales of pay vary from £430 per annum as minimum for an assistant lecturer to about £1,800 maximum for a senior lecturer with higher salaries for principles. Housing is provided for principles and some of the staff.

10.6. There are 37 Farm Institutes with about 2,000 students between them. Most of the institutes provide one year course, at the end of which the students sit for the Institute Certificate which includes an assessment of practical as well as theoretical work. The students may also take the national certificate in Agriculture, Horticulture, Poultry Husbandry or Dairying. The pass rate for the institute certificate is high, probably 80 to 90 per cent. The institutes are maintained by County Councils with the aid of 60 per cent grant from the Ministry. The Institutes' students nearly all take up practical work in agriculture and after further experience can expect to become specialist workers, foremen or bailiffs.

10.7. Apart from the principals there are 106 Senior Assistants and 280 Assistant Teachers at farm Institutes. There are no set scales for principals; individual salary scales are determined by local education authorities in agreement with the Minister. Factors taken into consideration are (a) the volume, importance and standard of the work for which a Principal is responsible, (b) the responsibilities of a particular post, (c) salaries for comparable posts in other establishments of further education. Housing is provided for principals and for some of the teaching staff. The scales* of pay for assistants are :—

(per annum)

(a) Senior Assistants £1,050—1,200

(b) Assistant Grade I £475-20-900

(c) Assistant Grade II £550-25-975

(d) Assistant Grade II £625-25-1,050

The minimum and maximum of the scales for Senior Assistants and Assistants may be increased where appropriate by £75 for graduate, £50 for Honours Degree, one increment of £25 for three years full time study leading to a degree two increments for 4 years' full time study leading to a higher degree, one increment for 3 years full time training leading to the award of National Diploma etc.

*These scales are for men. Scales for Women are slightly less. Equal pay for Women teachers is being introduced by instalments over a period of seven years.

APPENDIX III
STATEMENT SHOWING ESTIMATED AREA OF AGRICULTURAL
LAND REQUIRING CONSERVATION MEASURES :

Figures for 1953-54 (Pre-States Reorganization Commission) in million acres:

<i>Zone</i>	<i>State/Distt.</i>	<i>Net area cropped</i>	<i>Total Area under paddy</i>	<i>Irrigated area less paddy</i>	<i>Net area requiring Soil Conservation</i>	<i>Remarks</i>
(1)	(2)	(3)	(4)	(5)	(6)	(7)
1. Peninsular India (Deccan).	Bombay	42.926	3.285	0.698	38.943	
	Andhra	16.089	4.669	1.270	10.150	
	Madras -	16.311	6.425	2.068	7.818	
	Hyderabad	29.074	1.943	0.532	26.599	
	Mysore	8.255	0.871	0.343	7.041	
	Travancore Cochin	2.821	1.042	0.422	1.357	
	Coorg	0.190	0.093	..	0.097	
	TOTAL :	115.666	18.328	5.333	92.005	
2. Black Cotton soils of Central India.	Madhya Bharat	11.883	0.215	0.432	11.236	
	Bhopal	1.756	0.027	0.027	1.702	
	Madhya Pradesh	30.620	9.119	0.287	21.214	
	Vindhya Pradesh	4.430	1.169	0.195	3.066	
	TOTAL :	48.689	10.530	0.941	37.218	
3. Himalayan & Sub-Himalayan Areas.	Himachal Pradesh	0.667	0.112	0.106	0.449	
	Pepsu	4.625	0.590	2.194	1.841	
	Jammu & Kashmir	1.681	0.466	0.256	0.959	
	Punjab Distts. : Kangra Hoshiarpur	7.199	0.433	0.979	5.787	Only such of those hilly areas subjected to erosion have been taken into account from the Distts. shown.
	Ambala					
	Gurdaspur Hissar Rohtak Karnal.					

(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Uttar Pradesh : Garwal Tehgarwal Nainital Almora Dehra Dun.	1.887	0.529	0.092	1.266	Only such of those hilly areas subjected to erosion have been taken into account from the Distts. shown.
	TOTAL ..	16.059	2.130	3.627	10.302	
4. Red & Laterite Soils.	Bihar State : Chota Nagpur Santhal Paraganas W. Bengal Orissa Sambulpur Koraput.	6.438 5.247 4.512	4.947 4.917 2.404	0.056 0.109 0.049	1.435 0.221 2.059	Only such portions of the slopy hilly areas, which are subject to erosion, in Bihar, Orissa and West Bengal and have Red Soils by appearance are included.
	TOTAL ..	16.197	12.268	0.214	3.715	
GRAND TOTAL	..	196.611	43.255	10.115	143.771	

APPENDIX IV

STATEMENT SHOWING AREA OF CULTURAL WASTE LAND INCLUDING CURRENT FALLOW THAT REQUIRES SOIL CONSERVATION MEASURES

(Figures in million acres 1954-55)

Sl. No. (1)	State (2)	Fallow land (3)	Other uncultivated land (4)
1.	Andhra Pradesh	3.569	4.889
2.	Bombay	4.001	5.685
3.	Madhya Pradesh	4.685	20.139
4.	Orissa	2.484	7.437
5.	Punjab	1.309	1.776
6.	Uttar Pradesh	3.513	7.813
7.	West Bengal	1.133	1.820
8.	Madras	4.467	4.933
9.	Mysore	2.156	4.793
10.	Bhopal	0.071	0.481
11.	Madhya Bharat	0.806	6.870
12.	Travancore-Cochin	0.068	0.368
13.	Coorg	0.221	0.204
14.	Himachal Pradesh	0.679	1.020
15.	Pepsu	0.461	0.733
16.	Jammu & Kashmir	0.403	0.708
17.	Vindhya Pradesh	2.318	2.358
18.	Andaman, Nicobar, Manipur	0.048	0.575
TOTAL :		32.392	72.967
GRAND TOTAL :		105.359 million acres.	