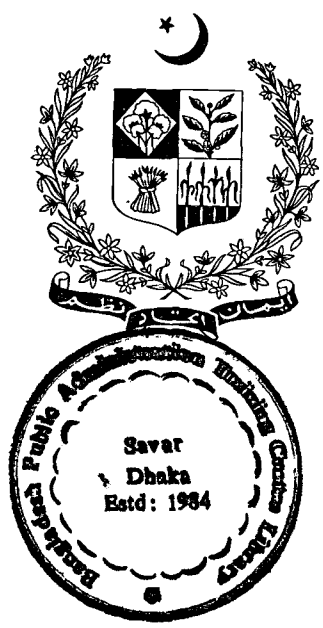
REPORT

OF THE

FOOD AND AGRICULTURE COMMISSION



17 AUG 2006

GOVERNMENT OF PAKISTAN
MINISTRY OF FOOD AND AGRICULTURE
November, 1960.

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PART I

INTRODUCTION

CHAPTER I.

THE FOOD & AGRICULTURE COMMISSION

1. The Food & Agriculture Commission was instituted in pursuance of the policy of the present Government to review conditions in various aspects of national life and was inaugurated by the Minister of Agriculture on 16th July 1959. A paramount need had arisen to increase agricultural production not only to meet recurring food shortages and to raise the standard of living of the farming population, but also to provide additional material, both raw and processed, to increase export earnings. The continual increase in population has emphasised the need to generate greater economic activity to provide more employment. The demand for foodstuffs is bound to rise steadily and the purchase of foodgrains from abroad is already causing a drain on foreign currency resources. To stop this drain, self-sufficiency in staple foods has become well-nigh a necessity. Moreover, at present the only method of substantially increasing the earnings of foreign exchange is to bring about a large scale rise in export of commodities originating in agriculture. On both counts, therefore, increased production from the land is now a matter of the highest national priority.

Terms of Reference

2. The following are the terms of reference of the Commission:

I. The Commission will make a thorough study and evaluation of past and current developmental activities and methods in the field of agriculture and of the incentives which cultivators have to increase production, for the purpose of determining the principal reasons which have accounted for the rather slow progress in production, particularly of food crops.

II. The Commission will fix the production goals for foodgrains and major non-food crops, which should be achieved in the light of their comparative net value per acre in terms of both rupees and of foreign exchange earned or saved, their comparative claims on limited water supply and the development of the market for them at home and abroad.

III. In the light of its evaluation of past experience and its determination of desirable production targets, the Commission will recommend:-

i) Any changes in the orientation and focus of the agricultural development effort it may consider advisable.

ii) Any measures it considers necessary to strengthen the organisation and personnel charged with responsibility for agricultural

development at the Centre and the Provinces, including any redefinition of the respective responsibilities of the Centre and the Provinces.

iii) Any measures it considers necessary to provide cultivators with greater incentives and means to raise their output and income, including those pertaining to taxation, pricing and procurement policies and methods, subsidies, credit and marketing.

iv) Any improvement in agricultural education and research and, above all, in the methods and organisation for transmitting the knowledge of better agricultural practices to the cultivators through the agricultural extension services, Village-AID Organisation, etc.

v) Any revisions in policies and methods of colonising new lands and maximising production thereon.

IV. The Commission shall pay particular attention to ways and means of obtaining more effective government administration and organisation of the agricultural effort and achieving better management of the land by organising the cultivators into cooperatives or other forms of profit-sharing schemes for the carrying out of certain common activities.

V. The Commission shall make a study of the cost, methods and policies relating to the procurement, distribution and storage of food with a view to devising recommendations in this field which will reconcile, as far as possible, the requirements of a continuous supply of food to the consumer at reasonable and stable prices and the need to provide adequate incentives to the cultivator to grow more food.

VI. While the Commission will concentrate primarily on ways and means to increase more rapidly the production of agricultural crops, and particularly food crops, it is authorised to extend its inquiry into related fields of forestry, animal husbandry and fisheries for the purpose of viewing the activities in this entire field in proper perspective and relationship to each other.

VII. In carrying out its work the Commission will take into account the limitations on resources in terms of finance, personnel and administration, which may particularly govern what can be under taken in the sphere of agricultural development and will work out recommendations, which will make the most economical use of these limited resources.

VIII. In discharging its responsibilities, the Commission will work in close cooperation with the Planning Commission. It will recommend specific measures for increasing agricultural production and for effective implementation of agricultural development programmes, and will also, where necessary, suggest changes in policies or emphasis in carrying out the existing development plans.

IX. The study as outlined above will take approximately one year. The Commission may, however, make interim recommendations on specific problems.

The Constitution of the Commission

The Commission was constituted as follows:

1) Malik Amir Muhammad Khan, Governor, West Pakistan	Chairman
2) Mr. G. S. Kehar, S. Q. A., Member, Planning Commission	Member
3) Mr. S. Inait Hussain Shah, Economist	Member
4) Mr. S. G. Kabir, Retired Joint Secretary to the Govt. of East Pakistan	Member
5) Mr. S. I. Haque, CSP Commissioner, Lahore Division	Member
6) Dr. M. O. Ghani, S. Q. A.,	Member (full-time)
7) Dr. A. G. Black	Member (full-time)
8) Mr. A. Gaitskell	Member (full-time)
9) Mr. M. A. Cheema, CSP	Member/Secretary-General (full-time)

The International Bank for Reconstruction & Development (World Bank) provided the services of Mr. Gaitskell and the Food & Agriculture Organization of the United Nations (FAO) those of Dr. Black as full-time members of the Commission. They had both arrived in Karachi by the 2nd of October, and started work immediately. Before their arrival the Commission carried out some preliminary studies and investigations.

5. The World Bank, FAO and International Cooperation Administration(ICA) lent the services of the following full-time advisers:-

Mr. J. D. Broatch	World Bank
Mr. D. K. Jones	FAO
Mr. G. W. Miller	World Bank
Dr. O. J. Wheatley	ICA

In addition, the World Bank placed the services of Professor Charles Hardin, and ICA, the services of Dr. Edwin C. Johnson at the disposal of the Commission for shorter periods. Professor Hardin spent three months in the country studying organisations and conditions of administration affecting agricultural production and prepared a report on 'Agricultural Administration in Pakistan'. During a two month visit, Dr. Johnson examined farming and rural credit facilities.

6. It was found far from easy to place the full-time services of local experts at the disposal of the Commission, as while the latter was deliberating, Central and Provincial Government staffs had to carry out their normal, very

full-time duties in addition to a number of urgent development and investigational programmes. However, a number of men was lent and seconded for varying periods and panels of experts were set up to give their considered opinions on all the main subjects on which fuller information was wanted. By means of consultation advantage was taken of the experience of the large body of foreign advisers working with such organisations as ICA, FAO and the Colombo Plan some of whom also served on panels.

Methods of Working

7. Seventeen panels consisting of specialists of the Central and provincial governments and some non-officials were created. The Commission provided each panel with an outline of the information required and with a number of questions on which opinions were sought. The panels were invited to add any further information which they thought should be brought to the notice of the Commission. They were particularly asked to give their considered views on existing organisations for agricultural development and on their difficulties and disabilities. A series of meetings was held in Lahore, Dacca, Karachi and Rawalpindi, some of which were attended by members of the Commission and their permanent advisers, and final reports were submitted between January and June this year. Much useful information was received and a number of valuable suggestions was made. Discussions were also held with experts and specialists jointly and separately which provided opportunity for a free and frank exchange of opinion and of information. The terms of reference of the panels are given in Appendix II.

8. At an early stage of its work the Commission prepared comprehensive questionnaires on all aspects of agricultural production and of conditions affecting production directly or indirectly. These questionnaires were issued to: (1) administrative authorities, (2) officials of the various departments concerned, some retired officials and the public in general, (3) selected farmers. Questionnaires were also published in the newspapers so that any interested member of the public could reply. The questionnaires appear in Appendix III.

9. Statistical information relating to the national economy was

obtained from all sources. The Ministry of Food and Agriculture, especially the Directorate of Agricultural Economics and Statistics, the Provincial Bureau of Statistics, West Pakistan, the Departments of the Provincial Governments, the Central Statistical Office and the Agricultural Census Organisation made all information freely available. Special surveys were carried out on behalf of the Commission by the Central Statistical Office.

10. The Commission inspected agricultural colleges, research institutes, experimental stations, seed farms and livestock farms and held discussions with the members of the staff of these institutions. A number of outstandingly successful private cropping and stock farms were also visited and examined and the reasons for their success analysed with owners and managers.

11. Members of the Commission undertook extensive tours in order to gain first-hand knowledge of the problems and difficulties of the farmer and of the staffing and equipment of organisations dealing with the farmer at the lowest level. They also examined intensively the work in eleven districts in West Pakistan and six in East Pakistan. For this intensive work the Commission divided itself into a number of small groups who, with their advisers, spent a minimum of three days in each district. Each group had discussions with officers of all grades of the departments and organisations concerned. They examined supply and storage arrangements down to village level, visited places of agricultural importance, talked with village leaders and with farmers working in the fields.[1]

12. Discussions were held with the Governors of East Pakistan and West Pakistan, the Minister of Food and Agriculture, the Minister of Finance, the Chairman and representatives of the Planning Commission, Provincial Development Commissioners and senior officers of the Central and provincial governments. The Commission also had the honour of being received by the President and of having an exchange of views with him.

Interim Report

13. The Ministry of Food & Agriculture asked at an early stage that an Interim Report be submitted to assist government in taking decisions on the

[1] See Appendix V for itinerary of the Commission.

following subjects:

(a) The suitability of establishing one or more Agricultural Development Corporations to increase agricultural production;

(b) Food procurement policies;

(c) The report of the Central Reorganisation Committee on the future organisation of the Ministry of Food & Agriculture; and

(d) The decision of the Economic Committee of the Cabinet that the Commission should report on steps necessary for increasing the production of cotton from the present level of 1.7 million bales to 2.5 million bales by 1965 and asked the Commission to make interim suggestions for the steps to be taken now.

14. An Interim Report was submitted at the end of February 1960. On item (a) the Commission expressed general views but asked that, as the subject was of such great importance and was likely to form the central feature of the Commission's whole investigations, its final recommendations be delayed until the main report was prepared. Detailed views with reasons and recommendations were given on items (b) and (c). When making recommendations on the methods of stepping up the production of cotton, item (d), the Commission also recommended a crash programme for the immediate increase in the production of the main grain crops, wheat in the West and rice in the East, by concentration on large increases in the application of fertilizers and in plant protection services. The full report is given in Appendix IV

Acknowledgements

15. The Commission is very grateful to the Central and provincial governments for the facilities offered and the help given and to all the experts and others who made up the panels or otherwise put their knowledge and views at the disposal of the Commission.

16. The Commission also wishes to place on record its deep appreciation of the services of its staff of all grades, technical, administrative and clerical. Working under very difficult conditions and often for long and irregular hours, only their keenness and hardwork has made it possible for the Commission to carry out its programme. It is unnecessary to particularise here as staff members will be thanked individually.

The Report

17. The Commission pursued its enquiries and studies for about a year.

During so short a time it was not possible to examine in detail all aspects of the many problems of agricultural production. But early in its deliberations, it became apparent to the Commission that the most serious stumbling blocks in the way of increased production were organisational. This is not to imply that economic, social and technical questions do not equally enter into the problem. Much more scientific and technical knowledge is required and certain disabilities of a social nature are of undoubted importance. The menace of salinity and waterlogging in West Pakistan which threatens most of the Indus Basin is a technical problem of great complexity and immediacy and there is urgent need for research and training in many directions. These technical questions, and the economic and social conditions which handicap production, are examined in considerable detail in this report. But the central fact confronting the Commission is that the consi lready available at higher levels is not being made use of owing to the lack of an effective instrument for the transmission of that knowledge to the cultivator and the means of using it. Much time has therefore been devoted by the Commission to the consideration of what is needed in terms of an effective organisation to provide advice, supplies, guidance and perhaps direction at farm level, to ensure increased production.

18. The lay-out of the report reflects its conviction of the importance of this need for an effective instrument of implementation. In Chapter 2, the recent historical background of the country is briefly surveyed, so that in the reading of this report due allowance is made for the perspective appropriate to it. The survey gives a picture of great achievement, in spheres other than agriculture, in the face of extreme disadvantages, and explains in part the comparative lack of attention to agriculture until the present time. Its next concern, in Part II, is to make clear the urgent need for rapid agricultural development now. The disquieting population trends, the static yields, the importance of agriculture both for food and for foreign exchange earnings are here set out and the nation's critical dependence upon the farmer made apparent. Following this, a study is made of the contemporary position of the

CHAPTER 2

DIFFICULTIES AND ACHIEVEMENTS OF PAKISTAN SINCE INDEPENDENCE

The Creation of Pakistan

1. The State of Pakistan was carved out of British India and is composed of the Muslim majority areas of that country. Muslim people wished to have a separate homeland where they could shape their own destiny in accordance with their own hopes and ideals and their cultural, religious and social values.

2. The Muslim majority areas consisted of the old provinces of the North West Frontier Province, Baluchistan, Sind, the western portion of the province of the Punjab and the eastern portion of the province of Bengal. These, with the later addition of the larger part of the district of Sylhet from Assam formed the State of Pakistan. The new country consists of two separate parts. According to 1951 population Census, West Pakistan had an area of 310,236 square miles and a population of 33.78 million people and East Pakistan an area of 54,501 sq. miles and a population of 42.06 million people.

3. This division of the country into two parts, separated by over a thousand miles of then hostile territory presented serious complications. Communication was by air across India or by the long sea route via Ceylon. Nor have the two parts much in common physically or climatically. The West has, in general, a hot dry climate in which agriculture can only be developed and expanded through expensive irrigation systems from canals or wells. The East lies in a subtropical high rainfall belt and has a population density among the highest in the world. The country was thus faced with the immediate task of integrating the different economies of two geographical entities. The people of the two wings were, however, united by bonds of strong patriotism and intense religious fervour.

Initial Difficulties

4. Independence came to Pakistan amidst great uncertainties, vast population movements and riots. Ten million Muslims left their homes in India to seek a new life in Pakistan and about eight million

non-Muslims left Pakistan for India. This tremendous movement, unplanned and unregulated, is one of the biggest in history and forms an important part of the background. Apart from the general confusion caused by such a mass movement of population and the troubles which accompanied it, there were many special features which greatly increased dislocation of the country's economy.

5. In British India, almost the whole of the banking and the industrial systems and most of the trading and commerce were in the hands of non-Muslims. Some increase in the Muslim share in commerce in West Punjab had been gained during the last few years before independence, but in East Pakistan, Muslims were mostly engaged in agriculture, and the marketing, processing and credit systems were entirely in the hands of the Hindus. In Sind and in the frontier region of West Pakistan, the farming community was mainly Muslim, but in the Punjab some of the good farmers were Sikhs and these left the country during the migrations of population.

6. In the administrative sphere the non-Muslim populations enjoyed greater educational advantages, and filled an unduly large proportion of appointments in the services, particularly in technical fields. After independence all Government servants were given the option of serving either Pakistan or India, and by and large, all Muslims decided to serve in Pakistan and all non-Muslims, except the local Christian population, to serve in India. This created very serious gaps and shortages in the administrative services of Pakistan. Agricultural administration, research and training has been centered largely in all-India institutions, almost all of which had their headquarters in what is today India. The Indian Institutes of Agricultural Research, the Indian Central Cotton

Committee, the Indian Central Jute Committee, the Tea and Sugarcane Research Institutes and other similar bodies had their headquarters there. In East Pakistan, except for the Agricultural College and a small research farm at Dacca, almost the entire Government machinery was based on Calcutta. Technical libraries were nearly all in India and the well equipped library at the Lyallpur Agricultural College was most unfortunately destroyed by fire at the time of Independence.

7. The new State thus came into being under great administrative handicaps. The higher ranks of the Civil Service had to be filled by rapid promotions and there was no effective organisation at lower levels. There were many gaps in the police force, particularly in senior posts, and police were urgently required to maintain order during the confusion which followed independence. Many of the troops who could have helped in this task were still abroad in various theatres of war - Malaya, Singapore and Burma. The railways were almost at a standstill through shortage of coal, which hitherto had come from India. Other transport services were disorganised and lacked essential supplies of fuel, oils and spare parts. In the absence of trained staff, banks and many of the larger commercial concerns had stopped working. Even the village money-lender had gone and most shops in town and villages were closed except for a few food shops and the Government ration depots. Many professors, teachers and research workers had left the universities, colleges and the research institutes. This affected Agriculture, Animal Husbandry and Cooperation and other departments. Extension services were similarly depleted and valuable records were lost. The funds at the disposal of the new Government were much below normal requirements and totally inadequate to cope with re-organisation or to resettle the ten million immigrants from India, the majority of whom were without money or possessions and had to be fed, housed and rehabilitated.

Rebuilding the Country

8. This is the background against which development must be considered. There was almost complete disorganization, a lack of funds,

a shortage of experienced administrators and technicians, a lack of banking, industrial and commercial organisations, of training and research institutions, and above all there were ten million almost destitute immigrants to be cared for. The Government of the day was faced with tremendous problems and only because it was supported by the efforts and hopes of the whole people was progress possible. During the early months attention was necessarily focussed on the need to re-organise the administration and rebuild the Civil and Police Services. The urgency of the refugee problem was such that it had to be given immediate and costly attention.

9. It was also obvious that if a more balanced economy was to be built up there was urgent need for industrial development. Most of the industries previously developed were situtated in what is now India. West Pakistan was left with only a few textile mills, one or two sugar and cement factories and some small engineering works. East Pakistan had a few textile mills, only one cement factory & some sugar factories, a few presses and small railway workshops. The Government devoted many of its resources to redress this imbalance in the early years and achieved considerable success. The newly created Pakistan Industrial Development Corporation and private enterprise between them have achieved, amongst others, the following advances. The cotton spinning industry has risen from 0.17 million to 2 million spindles; the jute textile industry from nil to 8,040 looms; cement production from 324,000 tons to about 1,280,000 tons annually; paper and cardboard production from nil to 58,000 tons annually; engineering works from 187 to 810, and chemical works from nil to 219. In the field of the processing of crops, the baling capacity for jute has been doubled, the factory production of sugar has risen from 30,000 tons to 170,000 tons annually; unfortunately the cotton ginning industry was closely linked with the problem of the rehabilitation of refugees and no planned programme of renovation was undertaken. The first artificial fertiliser factory was opened in 1958, it has a

capacity of 50,000 tons of ammonium sulphate per annum. Two other factories to make urea and ammonium nitrate are under construction, one in the East Wing and one in the West.

10. Another complicating factor was the disappearance of banking facilities and of commercial interests. Local people and refugees tried to fill the gap but they had to work with limited funds, no financial backing and little experience. The cooperative banks, which were the only banks functioning in the country, were induced to enter the commercial field and traders were encouraged to set up commission agencies in produce markets with their financial backing. This provided a start and a banking and commercial system has been gradually built up throughout the country. Foreign banks have reopened and expanded their offices, and new and specialised banks have been established. An attempt to organise cooperative marketing through multipurpose societies failed through lack of competent organisation. This was unfortunate and earned the cooperative movement a bad name even in areas like the Punjab where it had a good record of service.

Agricultural Conditions

11. During this time both the Ministry and the Departments of Agriculture had been working steadily trying to fill the vacancies left by the recent changes. With the help of the United Nations Organisation and its specialised agencies, and bilateral aid from friendly countries a considerable number of men received specialised training abroad. Four Agricultural Colleges were organised or re-organised and a second Animal Husbandry College was built. The Food and Agriculture Council, the Cotton and Jute Research Committees were created and a number of research institutes established. Extension services were strengthened and expanded These efforts achieved some success, but went a very small way towards meeting the needs of what is by far the greatest industry of the country. Production did not keep pace with the increasing population.

12.

establishment and expansion of industries and the improvement of communications and ports. Of the balance of funds available for agricultural development, the major portion went to large irrigation works and only comparatively little help was given to the agricultural producer directly. The early years were years of good crops and little smuggling and this tended to create a feeling of complacency in food production. In 1952, drought caused a shortage of wheat in West Pakistan and large quantities had to be imported Again, in 1956, a serious shortage of rice in East Pakistan necessitated the spending of considerable sums of foreign exchange, badly needed for development, on the import of food. The Government then began to realise the basic importance of agriculture and to see the need to organise and develop it as a major part of the country's economy. The calling of an agricultural conference in 1956 and the drawing up of a development programme were indication of this change of policy. Failure to implement the programme and to attain the objectives in the First Five Year Plan have further emphasised the need to give a great deal more attention to agriculture if the economy of the country is to be made sound.

13. That West Pakistan has become a food deficit area has puzzled many people. One of the facts not revealed by statistics is that before independence the West Punjab, while exporting wheat, was at the same time importing large quantities of coarse grains from East Punjab. This supply has nowbeen cut off. The increasing pace of urbanization has placed a higher pressure on wheat. There were other factors such as the steady increase in population, the upheaval caused by the exchange of population which often resulted in loss of leadership and a partial breakdown of community life. Many leading men in rural life now found it more advantageous to transfer their interests and capital from farming to the developing industry and commerce in the towns. Educated people and men of means who might have invested in the agricultural field started moving to the towns to take advantage of the better amenities and newer opportunities. Without guidance and faced with a virtual breakdown in

supply and marketing services, the farmer was unable to play a full part in the national upsurge of production.

14. Immigrants have had to adapt themselves to a new system of farming and have usually lacked sufficient capital to make the best use of the land allotted to them. Little help was extended to them either by way of advice or supplies. The temporary nature of the allotments of land to refugees was a further deterrent as, owing to uncertainty of tenure, even those with knowledge and capital hesitated to commit themselves to long term improvements. Many refugees who were allotted land in West Pakistan settled in the towns leaving the land either undeveloped or under the management of tenants who were handicapped by lack of credit or other forms of help from absentee landlords.

15. The quick profits to be made in commerce and industry tended to attract capital away from agricultural development. No one considered it worthwhile investing money to equip the farmer and only a few people put capital into land improvement. Agriculture was in serious danger of becoming a depressed industry.

16. The difficulties of the farmer in West Pakistan were aggravated by the shortage of water caused by the Canals dispute with India. Planning for the future was hampered by the fact that the headwaters of nearly all the great rivers of both West and East Pakistan lie outside the country. The ever growing menace of salinity will be even more serious if water supplies are reduced. It is perhaps not yet fully realised that while elsewhere there is a case for the use of water to irrigate more land, in West Pakistan additional water is vital for reclamation and for the prevention of the spread of salinity if millions of people are to continue even to eke out an existence on what was until recently productive land.

Achievements

17. We thus see in the recent past a picture of great achievements in extremely unfavourable circumstances. The main services of the country have been recreated and expanded. A steadily developing industry has been

created. Commerce and banking have been re-organised and are continually expanding. Many great power and irrigation works have been constructed. Only agriculture lags behind and does not effectively share in development and progress. In the following pages the reasons for this and the policies which are considered vital to ensure that agriculture also develops and progresses, are discussed.

PART II

NATION AND THE FARMER

CHAPTER 3

THE NATIONAL NEED FOR INCREASED AGRICULTURAL PRODUCTION

Introduction

1. It was stated in Chapter 2 that a series of good crops had tended to obscure the growing seriousness of the food situation in Pakistan. Only when there was a series of years with abnormal weather conditions combined with a steady and rapid population increase, did the food situation deteriorate to such an extent as to cause general concern and perhaps even alarm.

It is proposed in this Chapter to make a detailed analysis of the food problem of this country, of the importance of agricultural production in the national economy, and of the contribution that increased agricultural output could make towards economic growth.

The Nature of Food Problem

Population - Composition and Trends

2. An assessment of the future food needs of the country may be based on an examination of the trends in population growth. According to the 1951 Census, the annual rate of increment of population in Pakistan was estimated at 1.4 per cent. The present rate of growth is believed to be 1.6 per cent. As this rate seems to be gradually accelerating, it is expected to reach 1.8 per cent in 1965[1], the final year of the Second Five Year Plan. The total population in mid 1959 is estimated at 87.48 millions and is expected to reach the figure of 96.94 millions in mid 1965.[2]

At this rate of growth, the population of Pakistan has been increasing by about one million each year during the past seven years and is expected to reach the figure of 1.5 million each year during the next five years, representing an alarming addition in pressure upon the food producing potential of the nation. There is no doubt, therefore, that the country is moving towards a stage which can bring in its wake very serious

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[1] Rates of population increase in some countries are given in Appendix I Table 3.1

[2] See Appendix I Table 3.2 (The suggested rates may be conservative and may represent a minimum.)

problems unless economic growth outstrips population increase.

3. The latest available land utilization statistics are given in Table A on page 19. Out of the total cultivated area of 61.34 million acres in Pakistan 24 million acres are irrigated. There are .55 acres of cropped area per capita in East Pakistan and .90 acres per capita in West Pakistan. Out of the latter about .70 acres per person are irrigated. East Pakistan has therefore only about 60 percent as many cropped acres per capita as West Pakistan.

4. The density of population per sq. mile in West Pakistan and East Pakistan indicates the precariousness of the man/land ratio prevailing throughout the country. Density in East Pakistan rises to 1500 persons per sq. mile being amongst the highest in the world. Even at the rate of 1.6 percent, the population increase in East Pakistan means 4.43 million additional mouths to feed at the end of the plan period. Larger yearly increased food tonnage is consequently more urgently required in East Pakistan than in West Pakistan. The continuous increase in population will decrease the per capita cropped area in the country and the food position will deteriorate further unless total production is substantially increased. The deterioration will clearly be more pronounced in East Pakistan, and growing concern must be felt for the food situation there.

5. Urban population is increasing slowly. Persons living in towns do not produce their own food, and are dependent upon the marketable surpluses flowing from the farms of the nation. As the urban population further rises, this demand will become more pressing and will require ever growing production from the farms. In countries where agriculture is predominantly of the subsistence type, it becomes urgent to increase production for the country as a whole as well as per unit of area, so that the growing non-farm population may be adequately fed, without an alarming rise in food costs. As the country enlarges its industrial base the non-farm population will increase still more rapidly. Consequently the urban demand will become even more insistent; and unless ways are found

Table "A"

Land Utilisation in Pakistan - 1956-57 (July-June)

(000 acres)

Provinces	Total area	Area not reported	Area reported								Total area reported (columns 4,5,6 & 9)
			Forest area	Not available for cultivation	Other uncultivated land excluding current fallows	Cultivated area					
						Current fallows	Net area sown	Total area cultivated (columns 7 & 8)	Area sown more than once	Total cropped area (columns 8 & 10)	
1	2	3	4	5	6	7	8	9	10	11	12
East Pakistan*	35,382	,731	3,150	4,770	4,396	1,445	20,890	22,335	6,909	27,799	34,651
West Pakistan including Karachi Federal Area	198,444	82,591	3,181	51,716	21,947	8,031	31,078	39,009	3,930	35,008	15,853
Total Pakistan	233,826	83,322	6,331	56,486	26,343	9,373	51,968	61,344	10,839	62,807	50,504

*Figures relating to East Pakistan for the year 1953-54 have been repeated.

Source: Ministry of Food & Agriculture

to bring about a spectacular increase in production, it may become a source of social or even political unrest.

Food Requirements

6. For sound standards of health, a suitable diet must be available for the people both from the quantitative point of view as measured by caloric content, and from the qualitative point of view, as measured by the kind and quantity of proteins, the presence of sufficient amounts of 'protective' foods, and a minimum content of fats. Proteins should include a certain minimum of foods of animal origin. Protective foods include fruits and vegetables, particularly of the leafy kinds. These provide necessary vitamins and some minerals.

7. Only rough statistics of the consumption patterns in this country have been compiled. As reported to the Food and Agriculture Organisation of the United Nations, the typical Pakistan diet contains about 2150 calories per capita derived largely from cereals - wheat in West Pakistan and rice in East Pakistan. Its content of animal proteins and total proteins is low according to good nutritional standards.

8. There is a close relationship between the per capita incomes of countries and the quantity and quality of the diet of their populations. Low income countries usually have diets composed largely of starchy foods, the cheapest being those supplied by cereals. High income countries on the other hand, tend to reduce the quantities of starchy foods, and increase the consumption of higher priced foods such as meat, dairy products and fruits. The per capita consumption of wheat and potatoes in the United States, for example, has been declining for years. On the other hand the per capita consumption of meat, dairy products and fruits is very high. These are more expensive than are the cereal foods and it is only when incomes are high that people can afford to include these items in their diets in quantity.

1. Protein foods in Pakistan diet amount to 305 calories per day of which 156 are of animal origin (meat, eggs, milk, etc) and 86 calories per day of fats and 63 calories per day of fruits and vegetables. The caloric content of this diet compares with that of Japan. It is above Ceylon and India, but it is considerably less than that of some of the highly developed countries such as the U.S.A., U.K., and Sweden, as shown in Appendix I, Table 3.3

9. Pakistan's average per capita real income is one of the lowest in southeast Asia.[1] The increase of national income over a period of recent yea is slow, and this is obviously due to the rapidity of population growth. Low average incomes are usually found in predominantly agricultural nations. Frequently, as is the case in Pakistan, there is also heavy pressure of population upon the resources of land. In such cases, subsistence farming largely prevails and as family land holdings are small, farmers make sure of their own food supplies before thinking of supplying the market. They, therefore, prefer crops giving the largest yield of food. Cereals are given preference to crops like potatoes, as their keeping qualities are bette and their cultural requirements less exacting. In Pakistan, as in other countries of low incomes and high population pressures, cereals must, therefore, continue to be the principal food crops and the main-stay of the nation's diet.

10. As incomes determine to a large extent the quantity and quality food consumed, consideration must be given to the effect of increased income upon food consumption. It has been estimated in the Second Five Year Plan that the per capita income will increase by 10 percent during the period of the Plan. It can be expected that with an increase in per capita income, there will be an increase in demand for food stuffs. People will be willing and able to purchase more food if food prices do not increase, or if prices do increase they may still be in a position to purchase about the same quantity of food as was formerly purchased. Just what the quantitative relationships are in Pakistan cannot be stated with any degree of certainty, as no studies of income elasticity for food stuff have been made. Experience, however, suggests that in countries with low income, where the level of food consumption is low, the income elasticity for food stuffs is greater than in countries of high income having a high level of food consumption.

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1. See Appendix I Table 3.4, which gives comparative figures of national income in selected countries.

11. The reaction of people who produce their own food differs from that of urban people of the same income level, who must purchase all their food requirements in the market. In the former case, an increase of income may come primarily in the form of a larger quantity of physical production. In such a case, if the level of consumption is low, the reaction may be for the family to eat more of the home product, thus increasing food intake. This reaction appears only in low income countries, and only after the family has increased its own consumption will it consider sending more produce to the market. Indeed, if prices of food stuffs should increase as the result of a greater demand by non-farm purchasers, the quantity of produce sold by the small farmer may actually be less than before. At the higher prices fewer units of product will supply the cash needed to meet the modest cash requirements of the small cultivator, thus leaving a larger quantity for the family to consume.

12. After production has increased considerably and the economic conditions of the family have risen above the marginal level of consumption, it will increase its sales. The family will then feel the need for more cash to diversify its diet or to increase the use of non-food items. This will lead to a desire to change the pattern of agricultural production. With increased production per acre, the cultivator will find it desirable to plant a lesser number of acres with rice or wheat and devote the land thus released to fodder, thereby increasing animal production, and so adding to the quality of the family's diet and that of the nation generally.

13. It must be pointed out that as incomes rise the first result may well be that the producer releases less for the market. If this happens, prices of food stuffs will rise and inflationary tendencies develop. A ten percent increase in national incomes will increase the total purchasing power alarmingly. This will become a serious problem in the case of food, which will, as a result of this tendency, be under heavier pressure. The most effective methods of fighting these inflationary trends would be by a still further increase in the production of food items, not necessarily cereals,

Food production must, therefore, rise not only in a proportion higher than the rise in incomes, but the increase must also be above the additional consumption by the producer, and should result in a substantial increase in the marketable surplus. The only alternative would be to arrange for sufficient imports to make up for short production.

Yields of Major Food Grains

14. It will be seen that no significant trend can be identified from the figures in table B on page 24. Rice production in 1959-60 has been the highest on record and wheat production only inferior to that in 1948-49. Per acre yields of these crops, as given in Table 'C' on page 25, however, indicate a tendency towards decline. This is inspite of large investments in agricultural development and increased use of fertilizers and plant protection measures. A part of the explanation perhaps lies in the encroaching salinity and waterlogging of soils in West Pakistan and in the uncertainty of the weather in this period. That this is not all the explanation is evident however, from the fact that yields in Pakistan are among the lowest in the world, in spite of a large percentage of the wheat area being irrigated. In fact, an irrigated acre in Pakistan produces only 50 percent more than a no irrigated acre as against 300 to 400 percent more in other countries. The explanation of this undoubtedly lies largely in a low allowance of water per a

The total tonnage of foodgrains available for consumption from home production is given in Table 'D' on page 26. This table shows that there has been no appreciable increase in total production during the twelve year period. Only during 1959-60 has there been any significant departure from the prevailing trends. The fact that this year tonnage has resulted from record or near record crops, in both rice and wheat, sugges that there is no assurance of continuation of these record experiences.

Home production of food grains has been supplemented by imports of similar grain from abroad so as to provide the growing population with sufficient food.

Table "B"

Statement showing the production of principal crops of Pakistan
1948-49 to 1959-60

Year beginning 1st July

Crop	Unit	1948-49	1949-50	1950-51	1951-52	1952-53	1953-54	1954-55	1955-56	1956-57	1957-58	10 years average	1958-59	1959-60
Rice(cleaned)	000 tons	8,408	8,195	8,195	7,753	8,154	9,151	8,414	7,212	9,016	8,461	8,293	7,890	9,598
Wheat	"	3,993	3,885	3,950	2,984	2,391	3,611	3,162	3,339	3,606	3,544	3,446	3,863	3,904
Bajra	"	394	370	386	265	267	461	348	340	363	274	347	303	324
Jowar	"	242	267	244	205	220	288	220	249	255	181	237	215	229
Maize	"	375	404	384	379	349	404	427	453	449	442	407	466	480
Barley	"	191	163	144	115	108	143	122	143	129	168	243	139	158
Gram	"	804	651	791	474	369	615	656	732	716	716	649	600	717
Sugarcane(Gur)	"	10,228	10,800	8,817	8,780	10,895	12,876	12,454	12,043	12,639	14,878	11,441	15,418	14,105
Rape & Mustard	"	268	228	285	297	228	263	321	324	313	293	282	332	330
Sesamum	"	29	27	35	35	36	36	36	36	33	27	33	34	17
Tobacco	000 lbs.	141,436	148,744	162,351	178,945	167,132	194,433	280,896	197,428	192,077	202,373	186,582	218,361	N.A.
Cotton in 000 bales (of 392 lbs. each)		982	1,255	1,424	1,415	1,801	1,442	1,600	1,693	1,725	1,723	1,506	1,547	1,584
Jute bales in 000 of 400 lbs. each		5,479	3,333	6,007	6,331	6,823	3,610	4,662	5,592	5,514	6,200	5,355	6,000	5,363
Tea in	000 lbs.	34,250	38,875	37,856	47,130	51,274	52,024	54,006	52,629	54,734	44,632	46,741	53,502	57,000

Source: Directorate of Agricultural Economics & Statistics, Ministry of Food & Agriculture.

Table "C"

Per acre yield of principal crops in Pakistan from 1948-49 to 1959-60

(Year beginning 1st July) (In Maunds)

Year	Rice (Cleaned)	Wheat	Sugarcane	Tobacco	Cotton (Lint)	Jute
1948-49	10.6	10.2	393.2	10.5	1.6	14.2
1949-50	10.2	10.1	381.8	10.7	2.1	10.4
1950-51	10.0	9.9	345.8	11.0	2.2	17.1
1951-52	9.4	7.9	389.5	11.9	2.0	17.3
1952-53	9.6	6.8	339.7	11.7	2.5	17.4
1953-54	10.2	9.3	358.0	12.4	2.3	18.2
1954-55	9.7	8.1	333.3	14.1	2.4	18.2
1955-56	9.0	8.1	339.0	12.6	2.4	16.6
1956-57	10.9	8.4	329.9	12.9	2.3	21.8
1957-58	10.0	8.5	322.9	12.6	2.3	19.3
10 years average	10.0	8.7	345.6	12.1	2.2	16.7
1958-59	9.6	8.7	325.6	12.7	2.2	19.1
1959-60	11.6	8.4	294.2		2.2	19.0

Source: Central Statistical Office, Ministry of Finance.

Table "D"

'ood crops available for consumption
1948-49 to 1964-65

('000 tons)

Year	Total production	10% deduction for seed, etc.	Available for consumption from home production	Imports & exports	Total foodgrains available for consumption	
1948-49	12,867	1,287	11,580	97	11,677	
1949-50	13,404	1,340	12,064	189	12,253	
1950-51	13,249	1,325	11,924	240	11,684	
1951-52	12,702	1,270	11,432	32	11,400	
1952-53	12,076	1,208	10,868	282	11,150	
1953-54	12,794	1,279	11,515	1,108	12,623	ACTUALS
1954-55	13,149	1,315	11,834	1	11,835	
1955-56	11,530	1,153	10,377	37	10,340	
1956-57	13,549	1,355	12,194	1,018	13,212	
1957-58	13,119	1,312	11,807	1,063	12,870	
1958-59	12,544	1,254	11,290	579	11,869	
1959-60	14,625	1,463	13,162	718	13,880	
1960-61	13,453	1,345	12,108	1,399	13,507	
1961-62	13,848	1,385	12,463	1,378	13,841	
1962-63	14,371	1,438	12,938	1,238	14,176	ESTIMATES
1963-64	15,167	1,517	13,650	975	14,625	
1964-65	15,921	1,592	14,327	454	14,781	

Exports and Imports of Foodgrains

15. In the years 1950-51 and 1951-52, which followed a heavy crop in 1949-50, serious wheat shortages developed. In 1951-52, 270,000 tons were imported and in the following year another 282,000 tons. In 1953-54 imports jumped to 1,100,000 tons. The good crop of 1954-55 resulted in an almost complete cessation of food-grain imports, and permitted a small export in 1955-56. These erratic figures indicate an absence of any positive policy, and may have been due to a failure to properly assess requirements. It certainly took little account of the annual increments of population, or of the decision to build reserves. Except for small annual carry-overs, most of the imports were used for current consumption. The same pattern persisted until 1959 and imports continued at a similar level with a little more than a million tons imported in 1956-57 and a little less than a million tons in each of the following two years. A decision to build a reserve of half a million tons each of rice and wheat had been taken soon after these shortages developed. The building of the reserve, however, has only now started. Imports of 1.33 million tons of foodgrains in the current year have taken this factor into account.

16. Average imports for the first years after independence were 59,000 tons. The average for the last seven years was 737,000 tons. The average of the most recent four years is 1,021,000 tons. It appears, therefore, that during the period under consideration, the food situation has deteriorated from one requiring about 50,000 to 60,000 tons of imports to one requiring at least 1,000,000 tons.

Domestic production has increased hardly at all, except during 1959-60. The nation has become ever more dependent upon imports to meet the food demands of its growing population.

Projected Position of Major Food Grains Over the Next Six Years

17. The five year average tonnage of home production available for human consumption during the years 1955-60 is 12.78 million tons per annum. To this must be added 1.52 million tons to meet the need of

increasing population making a total average requirement (1964-65) of 14.3 million tons of grain for food. A further 1.59 million tons must be added for seed and other purposes. This makes a total production requirement of 15.9 million tons of foodgrains to make the country self sufficient in 1964-65. There must, therefore, be an annual increase in production of .62 million tons, or a total increase of 21 percent at the end of the Plan period.

18. Hence it appears that in 1964-65 increased production of foodgrains needed to reach self sufficiency will be of the order of 3 to 3 1/2 million tons. The Plan contemplates an increase of 21 percent taking all factors into consideration. This increase may well be a little below the requirements of 1964-65 and the need for additional effort becomes obvious. The task is a large one as perhaps no nation in the world has increased its production by the amount and percentage indicated here within a period of five years. That possibilities for doing so exist is indicated later on in this Report, but requires persistent efforts and hard work.

19. The above analysis has been limited to wheat and rice in view of their importance in the food economy. A short-fall in the production of any one of these crops has, in the past, resulted in food imports and this has necessitated a separate treatment for them. A number of other food grains is eaten in various quantities in the rural areas. The principal of

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1. In this calculation the additional foodgrains that may become necessary for the purpose of rotating the reserves of foodgrains, which are intended to be built, have not been taken into account. Nor has any account been taken of the additional requirements for animal feed if increased livestock production for food is to be arrived at. A recent study in India and Ceylon indicates that a rise of 1 percent in national income results in additional cereal consumption of .8 percent in the countries with a subsistence economy. The Second Five Year Plan envisages an increase of 10 percent in national income. This should mean additional cereal requirements of 8 percent if other factors remain constant.

these are millets, maize, sorghum, and grain. A picture of the production of these foodgrains is given in Table 'E' at page 30. It will be noticed that the food shortages of 1951-52 and 1952-53 in West Pakistan were less due to a heavy short-fall in wheat than to a fall in the production of these foodgrains. Rise or fall in their output is, therefore, a matter of some importance in the food economy.

The total production of these foodgrains has been erratic in the past 12 years but there is apparently a steady rise. It is likely, therefore, that any increase in production of these foodgrains would result in release of some pressure on rice and wheat. As indicated later, a larger increase in the production of maize may provide an answer.

30. There are other minor food items such as oil-seeds, sugar, fruits, meat, milk, ghee, eggs and poultry, vegetables and fish. None of these is being imported and the country is deemed to be self-sufficient in them. Shortages among these merely result in a lesser consumption and do not lead to famine. The statistical data on the production and consumption of these items is so meagre that any attempt at giving a picture will be inaccurate. On the basis of information available, we can only note that production of these qualitatively important items of food, falls far short of what good nutrition requires, and an attempt to increase their production is, therefore, vital in order to improve dietary standards.

Importance of Agricultural Production in the National Economy

21. The contribution of agriculture to the total economy of the country must be examined. The National Income estimates[1] of the country indicate that the agricultural sector contributes 12,477 million out of a total of 21,897 million rupees. This gives 57 percent as the contribution of this to the total national income. In 1949-50 the total national income was 17,230 millions. The present figure is 21,897 millions. The average of the first five

1. See Appendix I Table 3.5

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Table "E"

Production of other foodgrain crops in Pakistan
1948-49 to 1959-60

Year beginning 1st July. (000 tons)

Crop	1948-49	1949-50	1950-51	1951-52	1952-53	1953-54	1954-55	1955-56	1956-57	1957-58	10 years average	1958-59	1959-60
Bajra	394	370	386	265	267	461	348	340	363	274	347	303	324
Jowar	242	267	244	205	220	288	220	249	255	181	237	215	229
Maize	375	404	384	379	349	404	427	453	449	442	407	466	480
Barley	191	163	144	115	108	143	122	143	129	168	143	139	158

Source: Directorate of Agricultural Economics & Statistics, Ministry of Food & Agriculture.

years from 1950 to 1955 is 18,330 millions and average of the last five years is 20,820 millions. The annual gain in the national income is 2.1 per cent per year. In the agricultural sector on the other hand, the average agricultural income in the period between 1949-54 was 10,878 millions and during the last five years it averaged 11,903 millions giving an annual increase of 1.4 per cent. As against this, the annual increase in the non-agricultural sector of national income was 3 per cent.

22. Per capita income has increased gradually during the past 11 years from Rs. 232 in 1949-50 to Rs. 252 in 1959-60. On the basis of five years' average in the last 10 years, the per capita income has risen from Rs. 230 to Rs. 246, that is by 0.4 per cent per annum. The low increase in per capita income is mainly accounted for by the rapid growth in population through the period. In the absence of detailed information on the size of the farming population it has been calculated that 75 per cent of the civilian labour force constituted agricultural labour in 1951. If the proportion remains the same, the present population engaged in agriculture is 65.55 millions out of a total population of 86.82 millions. The average income per capita of the total farming population is therefore Rs. 191 as against Rs. 433 for the non-farming population. There has probably been a slight shift in the proportion of population since 1951, but the difference between the per capita income of farming population and that of the non-farming sector is still more marked and leads to the conclusion that a man working outside the agricultural sector earns twice as much as an agriculturist earns.

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[1] The national income estimates in the agricultural sector indicate that the calculated figures may well be higher. The estimated income from minor crops remained constant for the last seven years, Income from livestock is constant for the last eight years, fisheries for six years, and income from forestry for the entire 11 year period. As these items contribute more than 1/3rd of the total income it means that the rise in national income may well be higher.

Capital Formation

23. The relation of agricultural production to capital formation merits special attention as capital formation is essential to economic development. Speed of development depends largely upon the rapidity with which capital may be accumulated and utilized for development.

24. Higher agricultural production depends on a large increase in capital investment. The sources of such capital are primarily domestic savings and public revenue including custom duties, taxation, deficit financing, and foreign aid. Development expenditure will also involve considerable expenditure of foreign exchange for purchase of essential supplies for development not readily supplied from domestic sources.

25. Capital for agricultural development cannot come from within the agricultural sector alone. Earnings in agriculture, except in the case of a few landlords, have been so small that there is not much opportunity for savings from income in this sector. An important but undetermined amount of capital investment in agriculture is created by direct application of labour and available raw materials that do not need to be purchased with cash. Much of the rural housing is of this nature. So, too, are many of the land improvements such as land clearing and levelling of land, construction of water courses, bunds and drainage ditches. All such are capital improvements and for the country as a whole represent a considerable contribution to development. Such improvements are in a sense a 'substitution' for contribution to capital formation through 'saving' by the farm population.

One of the objectives of increasing agricultural production and agricultural income is to provide a source of greater savings either voluntarily or forced through taxation which may contribute to general development funds. Increased incomes in the agricultural sector through increased production are, therefore, vital to the national economy.

Balance of Payments

26. The field in which the agricultural sector contributes importantly to the economic development of the country is the production of commodities

that provide the nation with the bulk of its foreign exchange earnings. Pakistan's foreign exchange account has operated at a large deficit each year. During the period 1954-55 to 1959-60 foreign exchange earnings amounted to a total of 9554 million rupees.[1] Pakistan's foreign exchange account, however, for the same period amounted to a total of 14,455 million rupees leaving a deficit of 4,901 million rupees. This gap was filled by means of foreign aid, foreign loans, foreign investment, plus perhaps a small floating debt.[2]

27. Exports of agricultural raw materials constitute on a five years' average, 70 percent of total exports. If manufactures of cotton and jute are added, exports of agricultural origin constitute 80 percent of the total. It is evident that great amphasis must be placed upon the production and expansion of exportable agricultural commodities in any programme of agricultural development.

Although the emphasis of the present analysis is upon increased production of food crops, greater production of non-food crops is no less important. Although they may compete with food crops for land and other production requirements such as water, fertiliser, etc., the country is so dependent upon them for the bulk of its foreign exchange earnings, and probably will continue to be so dependent for a long time, that it is important that their production continue even though they may infringe upon the food production potential.

28. Annual food imports amount to almost 465 million rupees. This figure could be reduced or completely eliminated if domestic food production were increased. It represents a foreign exchange expenditure to the extent that if that amount could be reduced or eliminated, this much could be added directly or indirectly to the funds available for other development. This statement, though frequently heard, must be significantly qualified because a very large part of the food imports have been supplied through United States or Colombo Plan aid. Some of these food supplies have been in the

1. See Appendix I Table 3.6 2. See Appendix I Table 3.7

form of grants, but most of them are in the form of loans to be paid in local currency. The bulk of such repayments is to be used to defray rupee cost of approved development projects. To the extent to which food imports are paid for in this manner, they do not constitute a drain on foreign exchange.

The amount of food aid during the period 1955-56 to 1959-60 was 1,618 million rupees. The total food imports during the period was 2,330 million rupees. Thus 712 million rupees had to be supplied from Pakistan's own resources and represent a direct charge against foreign exchange reserves.

Projected Need for Non-Food Crops for Export and Internal Consumption

29. It is expected that exchange earnings from raw jute will remain about the same during the next five years as they have been during the past five years. During the period 1954-55 to 1958-59 raw jute exports averaged 843 million rupees per annum. The Planning Commission forecasts an annual average export, worth 800 million rupees, during the Second Plan period. A large increase in export of jute manufactures is also forecast, and it is expected to rise from 137 million rupees to 267 million rupees by 1964-65. This rise will require an increased production from about 6 million bales to 7.3 million bales, to meet both increased foreign and domestic requirements.

30. It is anticipated that cotton exports, raw and manufactured, will remain about the same during the next five years as they were in the past five years. Cotton production will, however, have to be increased to meet the growing domestic demand. The Second Five Year Plan envisages an increase of cotton production from 1.7 million bales to 2.3 million. The Government has expressed a desire to increase cotton production to 2.5 million bales.

31. Tea production is expected to increase from 54.3 million pounds to 63.8 million pounds during the next five years; and exports from 31 million rupees to 49 millions. Hides and skins and wool exports are not likely to increase because of domestic demand. A small amount, perhaps 75,000 tons of superior rice will no doubt find an export market. Despite a domestic food shortage this should be encouraged as it will purchase many more tons of foodstuffs from abroad for local consumption.

32. These objectives are expected to increase foreign exchange earnings from 9,554 to 10,600 million rupees.

Conclusions.

33. It is clear that continued development of both the agricultural and the non-agricultural sectors depends upon continuing availability of foreign exchange. Development of almost all kinds requires a quantity of goods and services that must be imported. These must be paid for with foreign exchange. It is, of course, expected that as development activities result in increased production, consumers goods and food stuffs, as well as goods needed for further development will be produced from domestic sources. To the extent that this occurs foreign exchange which is presently used for importation of these goods may be transferred to purchase of goods and services needed for development.

34. Pakistan's foreign exchange earnings are small relative to the demands for foreign exchange for both importation of consumption goods and of goods used in development. Pakistan's continued development is dependent upon foreign sources for a principal part of foreign exchange. These foreign sources are foreign aid, foreign borrowings and foreign investments in Pakistan. Dependence upon these sources is a vulnerable point in Pakistan's fiscal policies. Every effort must be made to lessen the dependence upon these sources by increasing exports.

35. Foreign exchange earnings are running at about two thousand million rupees annually. It should be noted that the earnings are insufficient to pay for non-development foreign exchange expenditures. In other words, all

development foreign exchange expenditures and a considerable part of non-development expenditure must be paid from foreign sources. About one-third of total imports in the First Five Year Plan were paid for by foreign assistance.

36. The examination of projected figures shows that annual foreign exchange earnings amount to about 9.3 percent of the gross national income. This may be contrasted with Ceylon where foreign exchange earnings constitute about 30 percent of the Gross National Product or Belgium which earns 40 percent of its national income in foreign exchange. The United States, however, in a recent year (1957) had exports in an amount only 5.8 percent of its national income, suggesting how little it is dependent upon foreign trade for its economic well being.

37. The foreign debt of Pakistan payable in foreign currency is $ 264.4 millions. Servicing and repayment of this debt amount to roughly about $ 30.0 million annually. Should the foreign debt increase, and it is expected to increase materially during coming five years, the annual debt service will constitute an increased drain upon the foreign exchange resources of the nation. As the foreign debt burden increases, it becomes all the more urgent that the foreign exchange earnings be increased.

38. It has been emphasised in the Second Five Year Plan that foreign aid must bulk heavily in meeting the demand for development

1. See Appendix I Tables 3.8 and 3.9

Should the projected plan be carried to completion, it is estimated that some 9,700 million rupees of foreign assistance would be needed. This is more than twice the amount received during the past five years. About 500 million rupees of the above are to be derived from private investment from abroad.

39. The need for husbanding foreign exchange resources to the utmost underlines the important part agriculture must play in making all possible contributions to foreign exchange accumulation, so essential to the general development of the country.

40. Although every source of increased earnings must be exploited, the major sources of such earnings are jute and cotton and their manufactures, plus hides and skins and tea. As these products are well established in foreign markets it might be easier to expand the sale of these products than of new products. The production and marketing of these is well known to the producer of the country. Every effort, therefore, should be directed towards expanding production and exportation of these goods. It must be recognised, however, that increased sales abroad will probably meet increased resistance but the country must be prepared to meet such sales resistance because of the increasing urgency of securing more foreign exchange.

41. It is, therefore, essential for the nation to give the highest priority to agricultural development. In such development lie the best opportunities for generating additional foreign exchange from domestic resources. These opportunities take the form both of increasing exports of agricultural raw materials (or their manufactures) and of saving exchange by increasing domestically produced food supplies and thus becoming less dependent upon imports.

42. In its quest for development Pakistan must not overlook any of its resources that might contribute to it. It may be possible that, one

of its most abundant and productive resources is being overlooked, or at least not being productively exploited. Development need not always require impressive importation of complex machines and even more complex processes. These will come, but let them come in their proper places and within the proper development context. In the meanwhile many development tasks can be done and much rewarding progress may be achieved by marshalling of abundant local resources.

43. In these pages population trends have been noted. It has been made clear also that the bulk of this population is agricultural. The productivity of agriculture suggests that the agricultural population must contain a segment of partially employed persons, or unemployed persons, or at least very inefficiently employed persons.

Here is a resource at hand, which if organized and directed, could contribute in a major way toward agricultural development, and that, at a minor cost in foreign exchange, and even at a minor rupee cost to the nation. Attention has been directed to the fact that in agriculture very considerable capital formation takes place directly and without cash expenditure. Such capital formation is difficult to evaluate and appears only partially if at all in published calculations of capital formations.

44. Nevertheless, capital formation of this kind could be measurably more impressive if the available labor resources in the countryside could be systematically mobilized and directed. This resource could be transformed directly into many capital improvements. Should the use of this readily available labor force be made a major project it could contribute importantly toward increasing the agricultural production potential by constructing minor reservoirs, check dams, water courses, drains, levelling land, constructing terraces to prevent erosion, checking gullies by tree planting or other means, building access roads, constructin village tanks and countless other similar projects. All these contribute directly to the productivity of the land and could be accomplished with

relatively little monetary cost to the nation.

45. It can hardly be overemphasised that the desperately low incomes of the agricultural people, of three quarters of the entire population, constitute one of the greatest handicaps to national development. In the past twelve years per capita farm income has fluctuated between rupees 180 and rupees 193. In recent years it has been about rupees 185 and has shown no significant trend. In fact, the average per capita agricultural income for the most recent five years is exactly the same as the average per capita agricultural income for the first five years after Independence.

46. It has been said that without industrialization population pressure upon agriculture would increase and the welfare of people generally could not be improved. One of the pre-requisites of industrialization is a domestic market able to absorb a large part of the products of the factories. Of course a good deal of industrialization can take place by producing more and more of those items which are now imported. This is particularly true of consumption items. Considerable industrialization can be devoted to production of goods for both domestic and export sale. Much of the industrialisation has been of this kind, as for example that in jute and cotton manufacturing.

47. Any sound industrialisation must be impressively supported by a vigorous domestic market. In Pakistan 75 percent of the people are agriculturally employed. The breadth and depth of the domestic market, therefore, depends upon the purchasing power of these people.

It has been established earlier that the economic welfare of this sector is not good. It has a pitiably low income, and a very considerable part of that income consists of value of food products consumed directly. The share of the total income received in cash available for purchase of non-food products is dismayingly small.

It would appear, therefore, that one of the chief objectives to be gained on the way to economic viability would be the systematical

improvement of the economic circumstances of the agricultural majority of the population.

48. Improving crop yields and total production will increase total and per capita agricultural income. This sector that now produces almost 60 percent of the national income, should it measurably improve the size of its production, would in consequence enjoy considerably larger purchasing power. This would result only if the increase of income were greater than the increase of population.

Increased production and increased income would generate greatly enlarged employment possibilities not only in agriculture itself, but in all those industries directly or indirectly affected by agriculture. Increased tonnage of crops would require more transportation facilities. These in turn would require additional workers to operate and maintain. All handling and merchandising and processing industries would increase in number and would likewise require enlarged store houses and equipment, all of which would require additional workers.

49. Greater income, also, will give new opportunities for new capital formation generated from the country's own resources. The higher income would not be confined to the agricultural sector but would in turn be a primary factor that would give impetus to increased incomes in the total economy.

50. With respect to the agricultural sector it now becomes apparent that the nation's requirements are of a triple nature. In the first place it would be desirable for the nation to achieve comparative self-sufficiency in major food grains. As will be explained elsewhere, the means for accomplishing this purpose are attainable and it is believed practicable of operation. The next major objective should be the increased production of other foodstuffs in order to add quality and diversity to the diet. This would add measurably to the general health and welfare of the population. Many of the increases here possible could be accomplished as the natural 'by product' of an improved agriculture and in a sense would mean the

conversion to useful purposes of resources or raw material often left unproductive. This subject, also, will be dealt with in detail later.

The final but perhaps even more important objective in the agricultural sector should be to increase its contribution to exports and to foreign exchange accumulation, either through increasing export crops or through manufactures or by reducing the need for purchasing foodstuff abroad.

51. All of these combined will give a great impetus to economic activity and should be given first priority. They can contribute greatly, can perhaps even be the key factor, in energizing the ' economic take-off' that the nation is so earnestly striving for. It is not an understatement to conclude that such a 'takeoff' can hardly be accomplished without first making significant improvements in agricultural production and in the lot of the farmers - whose present position is the subject of the next Chapter.

CHAPTER 4

THE PRESENT POSITION OF THE FARMER

Introduction

1. To be able fully to appreciate the position of the farmer, it is necessary to be aware of the main natural regions of the country, for different natural circumstances have resulted in different types of farming in different places. Pakistan is a land of contrasts. The West Wing links up with Middle East and Mediterranean conditions, and the East Wing with those in South East Asia. The West Wing has a hot dry climate, never far from desert influences, with a low rainfall ranging from 4 inches in the south-west to 40 inches near the foothills of the Himalayas in the north. The East Wing has a humid climate for much of the year with its lowest average annual rainfall around 60 inches on its western side but receiving up to 200 inches on the east. Wheat and cotton predominate in the West Wing, while rice and jute are the major crops in the East Wing. In the East Wing 63 percent of total area is cultivated compared with only about 20 percent in the West Wing, and more than half of this 20 percent needs irrigation.

Out of a total of 234 million acres in the whole country, 83 million(36 percent) are located in tribal areas, mostly in the northern and western hills of the West Wing, where very scanty land use records are available. Of the 150 million acres remaining, no less than 50 million, again in the West Wing, are classified as suitable only for grazing. Thus the general picture is of a heavy intensity of cultivation in East Pakistan, but in West Pakistan, of a cultivating population mainly concentrated in the irrigated plains and rainlands on the eastern and northern side. Adjoining them on the west lies a large tract given over mainly to rough grazing, and in the north-west another huge area of remote mountain tribal land. Although these contrasts overlie considerable further variations, the need for conciseness calls for some easily grasped main divisions, and we shall consider the farmer's position under the in-

following major regions of contrast:

a) East Pakistan (excluding the Chittagong Hills).
b) Canal Irrigated Plains of West Pakistan.
c) Sub-Montane Regions of West Pakistan.
d) Range Lands of West Pakistan.
e) Hill Catchment Areas of West Pakistan.
f) Chittagong Hill Tracts of East Pakistan.

East Pakistan

3. Excluding the Chittagong Hills and the Sunderban coastal forests in the Bay of Bengal, there is a general similarity in the cropping pattern throughout East Pakistan. The region is dominated by the river system of the Ganges, Brahmaputra and Meghna, providing one of the greatest water discharges in the world. Except in the north-west and in higher ground on the east, most of the land is like a delta and forms a great flood plain intersected by innumerable river branches and creeks, standing very little above sea level. The soil is generally fertile and the climate favours rapid growth, but the heavy rainfall comes almost entirely during six months of the year and the winter and spring can be astonishingly dry. The dominant influence of the rivers, discharging from the world's highest mountain range, and inevitable variations in the intensity and regularity of rainfall make the region peculiarly prone to hazards of flood or drought. In the south there is the additional problem of incursions by the sea into low lying areas.

4. The rivers and the rainfall determine the cropping pattern. Most of the region is devoted to the cultivation of rice, although jute which occupies 7 to 9 per cent of the land is an extremely important addition, and is the main earner of foreign exchange for the whole country. Oilseeds, tobacco, sugarcane and vegetables are grown to a minor extent and tea, another important foreign exchange earner, is grown in its special ecological area in Sylhet and Chittagong. Rice is peculiarly suited to these conditions and can be grown in three seasons, spring, summer and winter. Spring sown rice, known as aus, is, however, very dependent on spring rains; while winter sown rice, known as boro, is practically confined to

places where moisture remains and irrigation is possible. As a result the aus crop is seldom grown on more than 25 per cent of the land or the boro crop on more than 5 per cent. The summer sown rice, called aman, is the main crop and is grown on 70 per cent of the area. The farmers live in small village groups clustered along the higher ground, often with each individual homestead surrounded by its own grove of bamboo, betel-nut or coconut palms and its own vegetable patch. A most important feature of the cropping pattern is that, in spite of the apparent favourable conditions, double cropping is practised on less than one third of the crop land. Because of th dry winter, crop production is mainly confined to the rains in the summer, and about 75 per cent of the land is left uncultivated in winter. With excellent soil and without the hazards of flood at that season, good crops could be grown if irrigation was available. Water is available over most of the country, but so far irrigation has hardly been developed. It offers a great hope and a great challenge for the future and this hope is urgently needed, for the pressure of population is now among the heaviest in the world and is increasing rapidly. However, the introduction of expensive irrigation over large areas to farmers unfamiliar with its methods present many serious problems.

Population Pressure

5. The 1951 population census gave an average figure of 772 per square mile, ranging from 432 in Khulna to 1,500 in Tippera. On the 1951 figures the average area of cultivated land per head of population was half an acre. A more recent agricultural census (1960) showed that there were 6.5 million holdings in East Pakistan giving an average of 3.5 acres per family, but that 80 per cent of these families had less than 3 acres, while some 1.5 million people were landless labourers. These figures compare with those of crowded countries like Japan and Egypt but with the great difference that these countries attain far higher yields from their land than does East Pakistan. The great gap in yields offers at once a target and a hope for the future.

6. For the present the effect of the high man/land ratio is extremel

discouraging, and the growing population, adds to the anxiety. In the struggle for existence, 90 per cent of the land has to be devoted to rice, merely in order to provide enough food for subsistence and the diversification of cropping to improve diet can hardly be practised. Cattle, the only draught power for ploughing, and men, compete for the product of the land and both are overcrowded and under-employed. Pastures are destroyed in the man/animal competition and as a result bullocks are in a critically poor condition, and the land suffers from lack of proper cultivation resulting in low yields.

7. This vicious circle is made worse by the sub-division and fragmentation which follow from an increasing population and absence of spare land. The family unit is not in fact a fixed farm at all but a scattered collection of tiny holdings with a future inexorable break-up into yet smaller fragments. Any kind of management as a unit is almost impossible and merely to walk from one fragment to another involves a great expenditure of man and draught power, and consequent delays in the timely completion of cultivation operations. In such conditions consumption needs of most families often out-run production and there is nothing to spare either for savings or for any capital investment. Such conditions obviously form a very poor basis for a credit programme.

8. This situation places the farmer at a great disadvantage when selling his crop. The need for cash compels him to sell immediately he harvests his produce, and as most farmers are in the same position, the heavy sales regularly depress prices at the harvest season. Those short of food later in the year have often to buy back at much higher prices. Sales are made through the various agents of middlemen and those who own stores and processing plants have practically a monopoly control.

Marketing and Communications

9. The farmer's position is made worse by the absence in East Pakistan of a satisfactory system of regulated markets. There are no uniform standard weights and measures and no official system of grading and the farmer has seldom any knowledge of the prevalent prices elsewhere.

As a result he is frequently cheated, given no premium for quality and subjected to arbitrary deductions for driage, poor quality and for commission. In out-of-the-way buying posts to which he brings his produce, some distance by boat, he may be deliberately kept waiting all day so that by evening he will take a lower price rather than make a second journey. The 'hats' or local markets were in the past the perquisite of big landlords who farmed out the right to run the markets and fix market charges. The government has taken over these rights but continues the system of letting the market by auction, leaving the farmer just as subject as ever to the charges laid down by the successful bidder.

10. Escape from these conditions is made difficult for the farmer by appallingly bad communications. Good roads are a rarity and owing to the many rivers and streams and the lack of any road building materials, they are very costly. The need to cultivate every square yard of land results in almost a complete absence of access roads to farm plots and head-loading is often the only means of immediate egress from a farm. From streams and river banks movement by country boat is generally available but it is roundabout and slow. Power transport is as yet inadequately developed on inland waterways and the few railway lines in existence are of different gauges in the eastern and western sides of the province. All these conditions tend to preserve a considerable isolation in rural life and traditional ways remain.

Land Tenure

11. The condition of many farmers is further depressed by the terms of land tenure. An increasing number of farmers owning little or no land are put in an increasingly weak bargaining position vis-a-vis those who own land, and from whom they have to hire it. Land is continually passing into the hands of the monied and salaried classes who are not themselves cultivators. The customary system of hiring the land, the bargadar system, allows the owner a 50 per cent share in the crops without, in most cases, any contribution to the costs of production being made. Moreover, the hirer of the land has no security of tenure: by law he is regarded as a

labourer, not a tenant, and may be turned off at will.

The extent of the bargadar system is not exactly known and varies considerably from place to place. A man may be an owner of one plot and a bargadar on another. Present agricultural census figures indicate that over the whole province 38 per cent of the landholders and 44 per cent of the land are already affected by the system. Naturally in some places the intensity is likely to be much higher, in others lower. Attention needs to be drawn to the degree and terms of the bargadar system because of the depressing effect these have upon the actual cultivator's incentive to adopt any new practices involving additional effort or cost. Land reform legislation has placed a low ceiling of 33 1/3 acres or 3.3 acres per head to the amount of land an individual may own in East Pakistan. The Commission is not here concerned with any question of social or political inference; what it is concerned with is, that whatever benefits land reform may have brought, the customary system of hiring land continues to operate to the serious disadvantage of the actual cultivator and as such must be regarded as a considerable economic drawback to increased national production.

Summary

12. The prevailing circumstances of the majority of farmers in East Pakistan thus present a depressing picture and suggest the very anti-thesis of almost everything needed for increased agricultural production. The population pressure, fragmented holdings, declining buffock power, poor yields, pathetically low incomes and the lack of a fair-marketing system and good communications discourage endeavour and are rapidly leading to mass unemployment and mass poverty. Unless immediately remedied they may well confront the nation with a desperate situation within a generation.

Canal Irrigated Plains of West Pakistan

13. In West Pakistan a vast flat plain stretches from the foothills of the Himalayas in the north-east to the sea in the South. Bordered by desert on the south-east and by the hills of Baluchistan on the west, it is

traversed by five great rivers, the Indus, Jhelum, Chenab, Ravi and Sutlej in the northern region or the Punjab, and by the Indus river, after their junction, in the southern region or Sind. These rivers have a marked seasonal behaviour of high flood during the melting of the snows and during the rains, followed by a steep drop to a low discharge for the rest of the year. With the low rainfall and dry climate, the region originally supported only a small population and a semi-pastoral way of life, modified by the custom of the people of using the flood water in inundation canals to grow a seasonal crop in areas adjacent to the rivers. The soils of the region are inherently good, and over the last hundred years, the semi-desert plain has gradually been transformed by the introduction of the world's largest irrigation system. Today the area of irrigated land, 24 million acres, is 65 per cent of the total cultivated area of West Pakistan and its present agricultural importance is indicated by the fact that 64 per cent of the whea acreage, 89 per cent of the rice acreage and 96 per cent of cotton acreage in West Pakistan is located there.

Land Use Patterns

14. Certain characteristics of the irrigation system have determined the pattern of agriculture which has developed. There have until now been no storage reservoirs. Water is supplied to the land by diversion barrages and is thus dependent on the seasonal behaviour of the rivers and is not constant. Owing to the enormous difference between flood and low water, th canal system is operated on two methods, certain canals being termed perennial and obtaining whatever water is available from the river through out the year, and others termed non-perennial, obtaining water in the floo season only. Frequently, the non-perennial canals were made as improvements in the old inundation canals mostly in the areas adjacent to the rivers, while the perennial canals were directed to higher land previously uncultivated.

15. Certain marked differences of a socio-economic nature have arisen in the region from these conditions and in the course of the gradual spread of irrigation. In those parts which were empty of people, a

planned system of colonisation by peasant proprietors on standard unit holdings (about 12.5 acres) with planned villages and towns was pursued. In most of the Punjab, development has been of this nature and the land is largely owned by the farmers who cultivate it. The settlers were carefully selected from overcrowded regions with high farming traditions, and on the whole are excellent cultivators.

16. In Sind, where irrigation was introduced later, the land was owned by or given to big proprietors and colonisation from outside was less feasible. Before partition, 55 percent of the land was held in estates of over 100 acres, the farmers being mostly tenants. No definite records have been kept since partition, but it is known that the Hindus who left, owned about 40 percent of Sind area and that part of this went to large Muslim land-holders coming from India, and the balance in smaller portions to other refugees. Also at the time of the Land Reforms, 9.7 lakhs of acres were resumed by Government. In both processes the amount of land held by large owners has been reduced below the 55 percent existing before partition. Settlers were not selected because of their agricultural knowledge and experience and as a result the standard of cultivation is lower than in the Punjab.

17. The gradual introduction of colonies and of irrigation into sparsely populated land might be taken to indicate that no problem of over population arises in this region. Although there is nothing comparable with East Pakistan in this respect, and although irrigation is still being extended in comparatively empty areas in Sind, in the older colonies of the Punjab, founded almost a hundred years ago, there is now over-crowding. There the population has increased considerably, and the 1951 Census gave a density as high as 302 per square mile. This has led increasingly to an excessive degree of sub-division of the original family holdings which are now, in many places much too small. On top of this, an unfortunately high degree of fragmentation came into being with the departure of non-Muslims, Hindu and Sikh farmers, after

partition when the subsequent rehabilitation settlement had to distribute their lands over the claims of many people dispossessed in India. Thus th man/land ratio already requires a movement of population out of the Punj into the newly irrigated areas, and the degree of fragmentation already inhibits the operating efficiency of many units as manageable farms.

Land Tenure

18. When describing the position of the farmer in East Pakistan, we expressed concern at the adverse effect of the bargadar system of share-cropping. Conditions of land tenure of the farmers of the irrigated plains of West Pakistan vary considerably in accordance with the factors just described including that of rehabilitation. In the Punjab where, thanks to the colonisation system, 80 per cent of the land was found to be owner-cultivated at the time of land reform in 1959, share-cropping is less common. In the Punjab also, the refugees settled under rehabilitation have been mainly drawn from farming classes and continue to be owner cultivators. But in the Sind the matter is otherwise. There the custom of share-cropping had been the normal pattern on most of the estates, and although the Land Reforms have reduced the size of the larger estates, and on the land so resumed from landowners some 100,000 one-time tenants will in future be peasant proprietors, nevertheless over the bulk of the area the old system of share-cropping remains. Moreover in Sind where some 40 per cent of the land before partition was owned by Hindus, the rehabilitation settlement on these estates has not, as in the Punjab, taken the form of peasant proprietorship. Most of those allocated land have tended after allotment to live in towns as absentee owners and to leave the actual farming to share croppers.

19. The terms of share-cropping in the canal irrigated areas of the Punjab, in the regions where it is practised, vary from the terms in Sind. In the Punjab, the landowners' share has been fixed by law at 40 per cent, although this is not strictly or universally enforced, In actual practice, it varies by districts either in 40:60 or 50:50 ratio

with the landlords in some cases paying all land taxes, but in some areas, both land tax and water rates, as well as other costs of production are shared on either of the above basis. In all cases the tenant has security of tenure against arbitrary eviction. Indeed in some respects the security may be too great, for it is difficult to get rid of an inefficient tenant, or for the land owner to take over and farm the land himself. But in Sind, with its large share cropping element, terms of tenure are neither as clear cut nor as firmly established. The landlord pays taxes for land and water and takes 50 per cent of the crop, but too often does not bear his share of such costs, as seeds and fertilizers. We raise this matter of land tenure once again because when the terms of share-cropping permit an absentee owner to get too large a share and bear too little of the cost, and offer the tenant too little security, the farmer is discouraged from adopting improved methods which cost him more in money and effort. From the national point of view a deterrent of this kind over extensive areas can be a very serious limitation to increased production. In all these circumstances, an improved tenurial system which encourages land owner and tenant to find mutual advantages in adopting yield improvement practices, is needed.

Marketing and Communications

20. In the matter of communications and marketing also there is a marked difference between the Punjab and Sind. The region as a whole is traversed by the main trunk road and main railway line from Karachi to the north-west frontier, but in the Punjab colonisation has led to an extensive network of subsidiary roads and railways, and the growth of towns and local industries forms a comparatively ready competitive market for farm produce. Although there is room for improvement in lateral access roads and in the surfacing of country roads, communications are not a serious obstacle to marketing. By contrast in Sind communications are very poor in the outlying areas. In marketing facilities the Punjab, in spite of many shortcomings, still offers a lead to the whole country, the planned market towns being equipped with amenities, controlled

charges, standard weights and measures and in places an intelligence service on prices. In Sind again, these services are either generally lacking or are not as good as in the Punjab, and their absence, combined with poor communications and conditions of tenure tend to put farmers there much more in the power of merchants and processors.

Salinity and Waterlogging

21. A general picture might be formed from the above description of a fairly prosperous Punjab peopled by a community of good farmers, becoming rapidly overcrowded, but with an adjacent area in Sind with great opportunities for expansion. It might also be thought that if some of the people and features of the Punjab were transferred to adjoining areas there would be a general gain to the farming standards of the country and all would be well. Unfortunately there has to be taken into account at this point a condition which threatens the whole irrigated area of both the Punjab and Sind, a condition which is of such gravity that it dwarfs all others in importance. This is the spread of salinity and waterlogging throughout the irrigated areas of the Indus basin. The subject is a most complicated one, involving the interacting effects of water spread too thinly, of excessive salinity in the soil, of a rise in the water table leading to waterlogging, and the absence of any satisfactory system of drainage. The gravity of the position may be gauged by the fact that unless a solution is found, a very large proportion of the irrigated area may pass out of cultivation altogether in the comparatively near future.

22. In considering the conditions responsible for salinity, the first thing is the amount of water supplied to the crops. The cropping system in the canal irrigated area has been determined largely by the general conditions already described. The underlying purpose of introducing irrigation has affected the amount of water supplied to the crops. This purpose was primarily to settle a large number of people on the land. The water allocations were calculated to supply the minimum needs of a family for a subsistence crop for themselves, a fodder crop for their draught and milk animals and a cash crop, usually sugarcane or cotton, appropriate to

nature. Naturally the low yield has also meant a low income for the individual farmer.

24. One reason for the low yield is that farmers, as their families have grown, have tended to plant more than the planned proportion of their gross acreage for which the water is supplied. The resultant spread of water even more thinly than intended has meant that, in the absence of providential rain, the crops tend to be far too short of water to give maximum yields. Moreover, because of the size of the canals and the availability of water, use cannot now be made of the possibility of obtaining fertility without a fallow by much greater application of fertiliser, thereby stepping up both the acreage planted and the yield per acre. Increased yield and acreage demand additional water, whereas reduction below what is already a minimum supply makes it uneconomic to use fertilizer at all or indeed to incur any additional expenditure against the high risk of a low yield.

25. More important, however, than the effect of too thin a spread of water on yield has been its effect on salinity. Analysis of the river waters has shown them to be remarkably free of salts, so it is not the irrigation water itself which is causing salinity. The soils of the plain, perhaps once a shallow sea, contain large quantities of salt. Scattered in width and depth in a general manner in the soil before irrigation, salts have become more concentrated on or near the surface as a result of the system of irrigation. The process has been gradual over the years but has now reached a crisis. This crisis has two aspects. In the first, salts have increasingly become concentrated on the surface and in the upper layers of the soil by capillary attraction and evaporation. It is in this aspect that the quantity of water applied to the crops is significant, for what is needed is not merely enough water for maximum yields but an additional quantity to wash the salts down and away. By contrast, what is happening is that the present thin spread of water and the exposure of the land is bringing about the upward movement of salts.

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26. The second aspect is the ground water table. In the Punjab, when irrigation began, the ground water is known to have been at a depth of 80 to 100 feet, but since irrigation was introduced it has risen steadily. A number of factors are responsible for this - seepage from the canals and water-ways, the development of canals, roads and railways often cutting across and impeding the natural flow of drainage to the rivers, storm water, rain and irrigation water itself have all added to the ground water. Waterlogging and high water tables have become particularly bad in recent years in part of the Punjab when a spell of unusually heavy rain has caused widespread floods. In more recent irrigation areas like the Thal and in Sind, ground water started much nearer to the surface and over many parts of the irrigated area a rise in the water table of one foot per annum is being recorded. In the rich Rachna and Chaj doabs of the Punjab, out of 10 million acres, in only one-fifth of the area is the ground water still below 15 feet, while in over one million acres the water table is above 5 feet. In parts of the Thal and Sind the situation is much the same. The effect of the rise in the water table is not merely that of waterlogging the ground but of bringing the salts up near the surface where evaporation causes their concentration in the rooting area of crops.

27. We deal in a later chapter with the techniques for combating salinity and waterlogging and with the provision of additional water to encourage the production of maximum rather than minimum crop yields. The point to be emphasised here is that the thin spread of water, the increase in salinity in the top layers of soil, the rise in the water table and the absence of drainage combine to bring the whole irrigated area within range of serious damage to crop production at an increasingly alarming rate. Salinity is a greater problem than waterlogging, and appears in patches all over the place, so that one part of an individual farmer's holding may be severely affected and unable to produce a crop and another part lightly affected and thereby reduced in yield. It may

on the value of adopting any aids to increasing production which may be recommended to him.

30. The sub-montane regions of West Pakistan make a substantial contribution to national production. It lies to the north and north-west, between the Himalayan foothills in the north and the Salt Range in the south and has a total area of about 15.6 million acres. Its land use pattern shows that crop-land is 46.1 per cent, forests 4.6 per cent and grazing lands 47.2 per cent, of the total area.

The region has extremes of climate; night temperatures during January and February often fall below freezing point while day temperatures may be as high as 75°F. Summer maxima range from between 90 and 115°F. The mean annual rainfall varies from 15 inches in the south and the south-east to about 40 inches along the base of the northern foothills. To the east of the Indus the greater portion of the annual rainfall occurs during summer (June to September), but there are appreciable winter rains. Rainfall is adequate and reliable enough to permit fair security of cropping without irrigation in both seasons, but the occasional abnormal year, in which rainfall may be limited in amount or erratic in distribution, can cause severe reduction in crop yields. In the area west of the Indus rainfall is distributed equally during summer and winter and the reliability of the winter rains gives a large measure of security to the rabi cropping.

31. Dry cropping is the predominant form of cultivation and covers about 60 per cent of the crop-land in the region. The main crops grown are wheat, maize, sorghum, millets and pulses while peanuts have been recently introduced. The intensity of cropping is usually 100 per cent but in small areas near villages which receive farmyard manure regularly

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[1]Land use, metereological, crop & yield and stock figures are given in Appendix I, tables 4.I to 4.6

it may be as high as 200 percent. A fairly common rotation is:

	Kharif	Rabi
1st year	Fallow	Wheat
2nd year	Sorghum or Millets or Pulses.	Fallow

Most of the land does not receive any manure or fertilizer and green manuring is not practised. The acreage under leguminous crops and fodders is very small, so that fallowing is the most important method of restoring the fertility of the land, but the beneficial effect of this is partially offset by the loss of topsoil through erosion during the fallow period when the soil has no protective vegetative cover. The area cropped with the help of seasonal inundations is 2.9 percent of the total and wheat is the chief crop grown as the land is under water during summer and cannot then be cultivated.

32. Near the foothills the slopes are seamed by innumerable torrent beds which carry flood water after rainfall in their hill catchments. The flood water may be diverted, impounded into dyked fields and the moisture conserved for raising crops, chiefly wheat during winter and sorghum during summer. These lands, which represent 12.0 percent of the cultivated area of the region, are very productive and retain moisture for a long time as they receive fresh silt with each flood. The yields obtained compa favourably with those of irrigated crops.

33. The areas irrigated from canals and wells are 17.6 and 8.1 percent respectively of the total arable land. Peshawar and Mardan distric have the bulk of the canal irrigated area, while areas irrigated from wells are mostly found in the Attock, Gujrat and Sialkot districts. In canal areas the chief crops grown are sugarcane, maize, tobacco, wheat, berseem, ar fruits with an average cropping intensity of 150 percent which compares favourably with other canal irrigated tracts. The areas irrigated from wells in Sialkot and Gujrat are also very productive and intensively

are cured and sold by the farmers themselves. Fruits are often sold to dealers on the tree, while vegetables, including potatoes, are sold immediately after harvesting. Grading and sorting of fruits and vegetables are unknown and the pernicious practice of 'topping' is wide-spread.

The need for farmers' marketing organisations is obvious, as even the small shopkeepers who purchase from the farmers are badly organised and have few storehouses. There is a limited number of cold-stores, but the advantages they provide are to the dealers and they bring little benefit to farmers.

Communications

37. Most of the large towns are connected with each other and outside areas by good roads and by rail, but the villages have poor access roads, except in Sialkot, Mardan and Peshawar districts. Many of the village kacha roads, which are, at best, fair-weather roads, have been damaged by gullies and ravines and reduced to bridle paths, so that produce must often be transported by pack animals.

Land Tenure

38. The region is a land of small peasant proprietors, except the Dera Ismail Khan and Mianwali districts where some large estates are to be found. The holdings are so very small that many owners have either migrated to canal-irrigated areas, or joined the army or taken up other occupations. Their land is usually leased to other small owners on a share-cropping system. The tenants are required to provide bullocks, manual labour and seed, while the owner of the land receives a proportion of the production. The owners' share amounts to 33 to 40 percent of the produce from barani areas, and 33 percent from land irrigated from wells. In some cases, especially in Mardan, the land is leased on cash rents.

Soil and Soil Erosion

39. The soils of the region consist of alluvial, loessial and residual materials of highly variable texture. The irrigated areas are very fertile and intensively cultivated, but in general the soils are low in organic.

matter, phosphorus and nitrogen. Saline and waterlogged lands are not extensive.

The topography is undulating and soil erosion is a serious problem over the greater part of the region. The drainage courses, rivers and other tributaries lie much below the general level of the land and their edges are fretted with deep gullies. The biggest and most intricate gully systems have developed where the soils are deep, leaving uneroded pinnacles and precipitous cliffs in place of level fertile plains. Some gullies have almost vertical sides and flat bottoms on which cropping has been resumed. Evidence suggests that much of this region was once covered with forests or pasture land and cultivation was confined to relatively level plains or along the river banks. The sloping land was thus protected by vegetation and there was no soil erosion. Increasing population brought about an extension of cultivated lands and since all the better sites had long been under the plough, the new fields were carved out of forests and pastures on sloping lands. Pastures gradually diminished and the hungry animals invaded the forests as they were felled and burned. The precarious natural balance between the protective vegetative cover and the soil was upset and erosion became a serious problem. Farmers have tried to protect their lands by terracing and by the construction of embankments, but ignorant of proper techniques and lacking in resources, they have been only partially successful. The resultant damage and loss has not been confined to the foothill areas as the uncontrolled runoff from the eroding areas causes floods which damage productive lands in the plains. In the eroded lands modern scientific methods for increasing agricultural production give only partial returns, because the improved techniques are offset by the decline in the productive capacity of the soil.

The rate at which croplands are going out of cultivation is alarming and has been estimated by the Photographic Survey Corporation of Canada who are carrying out a soil survey of the Indus Valley for WAPDA. They state that of a total of 15.6 million acres in the region 1.8 million

of the irrigated land are comparatively free from erosion; that the remaining 13.8 million acres are affected in varying degrees, with 4.3 million acres rendered unproductive.

Range Lands of West Pakistan

General Picture

40. There are no complete statistics of the range lands in West Pakistan, but an indication of the extent of such areas is provided by the Ministry of Agriculture as follows:

	Million acres
Area for which land use statistics are not available.	82.6
Forests.	3.2
Not available for cultivation.	51.7
Culturable waste.	21.9
Cultivated area.	38.9
Total	198.3

The area, for which land-usage statistics are not available, lies in Kalat and Quetta Divisions and the Tribal Areas in the north-west.

Rainfall is not adequate for dry farming and irrigation water is available only in very limited quantity. In consequence hardly 5 percent of the area is cultivated and the remainder is used chiefly for grazing. The areas shown as cultivable waste are also used for grazing and are scattered all over the country in patches of varying size. The larger portions include Tharparkar and Kohistan of Sind, Registan of Khairpur and Cholistan of Bahawalpur. The area not available for cultivation includes lands which are unsuitable for cultivation and information to hand suggests that about 90 percent of these can be presumed to be used for grazing. The total range land is about 150 million acres or 75 percent of West Pakistan.

41. The range lands other than those of the hill catchments and

the sub-mountainous regions can be broadly divided into the following 5 regions on the basis of physiography and climate:

(a) North-western range lands: These comprise part of Quetta Division north of Ziarat and the Tribal Areas. The region consists of rugged mountains and valleys varying in elevation from 2000 to 7000 feet above sea level. The mean annual rainfall varies from 10 to 17 inches and is almost equally distributed between summer and winter.

(b) South-western range lands: These consist of part of the Quetta Division south of Ziarat and Kalat Division other than Kharan and Chagai Districts. This is a winter rainfall area with a mean annual rainfall of 4 inches.

(c) Chagai-Kharan range lands: This is an extremely dry area with a mean annual rainfall of under 4 inches, most of which falls during winter.

(d) Kohistan range lands: These are located in the Kohistan area of Hyderabad Division. The mean annual rainfall is 7 inches, the bulk of which occurs during summer.

(e) Sandy range lands of Tharparkar, Registan & Cholistan: These lands which lie very little above sea level, have a mean annual rainfall varying from 3 to 20 inches precipitated mostly during summer.

42. The position of these various areas is shown on the accompanying map. The north-western, south-western, Chagai-Kharan and Kohistan range lands extend from sea-level and comprise rugged hills, varying in elevation up to 10,000 feet. While rainfall is generally too erratic and meagre to grow crops, barani cultivation is sometimes carried out in years of good and timely rains, but these rarely occur more often than once in ten years. At places, however, flood water is diverted from the streams, impounded into dyked fields and crops, chiefly wheat and sorghum, raised on the retained moisture. Perennial irrigation water is scarce, but wherever it is available, in the form of springs or chains of wells (Karez), crops such as deciduous fruits, vegetables, wheat and

alfa-alfa are grown. Irrigated areas do not comprise more than 5 per cent of the total land, so that the peasants depend largely on grazing animals for their livelihood. The economy of the tract is essentially pastoral and, apart from the fortunate few who possess land in the irrigated areas, the peasants have a low standard of living.

The exact ownership status of these grazing lands has not so far been determined, and while there are no accurate data of the number of livestock grazed, the condition of the vegetation indicates overgrazing and bad management. The grasslands have deteriorated to such an extent that annual grasses of low palatability and feeding value, weeds and useless shrubs have become dominant at the expense of more palatable and nutritious perennial grass species. Areas of good grazing are to be found in places remote from water points, because they have been protected by their isolation. In much of the area the ground is now bare of any protective vegetation and soil erosion is widespread. As a result of this bad grazing management and lack of alternative fodder, the livestock industry has been adversely affected. All the land use by a particular tribe, other than irrigated land, is used in common. In consequence it is cared for by no one and this is responsible in large measure for the abuses described.

The Thar, Registan and Cholistan range lands are mostly sandy areas dotted with dunes. In years of timely and good rainfall, the entire area may be covered with vegetation, but here, as in other range areas, grazing management is bad, and in a low rainfall year much of the vegetation is destroyed and the soil is exposed to severe wind erosion. The high rainfall area of southern Thar (locally known as Parkar area) is exceptional in the quality of its grazing land.

The actual contribution made by these range areas to total national production is not known as sufficient data have not been collected. The area, however, makes an appreciable contribution in respect of the specialised forms of production such as fruits, hides, skins

wool, meat and stock bulls.

Population

43. The area is very sparsely populated - 9 persons per sq. mile in Quetta and Kalat Divisions, 14 in Kohistan and 30 in Thar compared with 109 for the whole of West Pakistan. However, where there is irrigation water, the density of population is comparable with that in canal irrigated areas and size of holdings is very small.

The population of livestock is high in relation to the present carrying capacity of the range-lands. The livestock population of Quetta and Kalat Divisions for example is estimated as follows:

Cattle	2,99,000
Buffaloes	11,000
Sheep	9,80, 000
Goats	8,30, 000
Horses & Mules	15,000
Donkeys	76,000
Camels	80,000

Grazing systems

44. The system of grazing adopted in the western and northern range areas includes settled habitation within defined tribal territories and transhumant movement of stock from highlands to lowlands. These migrations may be movements entirely within the boundaries of Pakistan, or they may involve longer treks crossing the border between Afghanistan and Pakistan. The annual appearance of Powindahs, along the major and minor passes from Afghanistan to Pakistan, brings mixed blessings to Pakistan; the people are hard working and often have special skills, but they bring disadvantages too. They drive in considerable numbers of stock and with them the risk of disease infection, and they contribute markedly to the problems of grazing management along their established routes.

In the eastern range lands the pattern of use is not well defined. In the higher rainfall areas, settled village communities graze their village lands and produce crops on monsoon rainfall. The construction of earth dykes around cultivated lands to hold up flood water is a well

developed practice. In the lower rainfall areas grazing is seasonal, following the monsoon, and persisting up to the turn of the year. Then most of the people migrate with their animals from their villages to the canal colonies to seek work. Use is made of the grazing in these areas by larger landowners from the canal colonies who employ local people as shepherds.

Marketing and Communications

45. The comments under this head apply to the Quetta/Kalat region, and while the difficulties encountered by producers are greater here than elsewhere, much of what is said about livestock marketing applies to other range areas also.

Some sheep and goats are sold in the nearest towns for local consumption, but the main market is Karachi. Animals may be purchased by dealers and taken to Karachi or they may be taken there by the flock-owners themselves. In either case they usually travel on the hoof and during the long journey lose weight and, in consequence, some of their value.

Carpet wool is produced, but as the colour is variable, and the wool difficult to process and dye, it fetches low prices. It is usually sold by the shepherds to dealers in single fleeces or 'bundles' irrespective of weight or quality.

In addition to sheep and goats for meat, skins and wool, the region produces, in Bhagnari, the best draught cattle of the country. These are in great demand and many of them are marketed at the annual sale at Sibi. The Loralai area also is famous for its Lohani breed of cattle which is small and active and very suitable for draught in hilly areas. Surplus stock sells readily for use elsewhere.

The processing of cattle hides is done in a primitive manner involving only salting and sun-drying. Skins are purchased by dealers and shipped to Karachi, but because they have been poorly processed, they tend to break during curing and command only a low price.

Fruit Marketing

46. Though the region has a predominantly pastoral economy, there

are areas which produce substantial quantities of fruit and vegetables in addition to subsistence crops. The fruits grown depend on local climate but the commonest are apples, pomegranates, grapes, apricots, plums, peaches, almonds, melons and dates, while the main vegetable crops are potatoes and onions. The potato crop of Quetta is of special importance because of its value as seed for use in the plains.

The growers seldom pick fruit for sale, it is sold on the trees to dealers who are responsible for harvesting and transport to market. Potatoes, onions and wheat are usually sold on the farm to middlemen who send them to various markets, and since farmers have no means of knowing the current market prices they often fail to receive proper value for their products. In an attempt to get higher prices, early in the season, crops are frequently harvested prematurely. While higher prices per unit may be obtained, this does not offset the overall loss in yield and, in the case of fruit particularly, a very inferior product enters the market. It is estimated that potato and onion yields are reduced by as much as 25 per-cent as a result of premature harvesting.

Means of storage are completely inadequate with the result that crops fetch low prices when the market is glutted. Under poor storage quality deteriorates and this further adversely affects price. Grading of produce is almost unknown in the region. Instead, the undesirable practice of 'topping' inferior products with a surface layer of good quality is very common when fruits and vegetables are packed for the market.

Since the region is sparsely populated, fruit and vegetable production is in excess of local requirements and surplus produce must be shipped to big markets like Karachi and Lahore. The Quetta and Kalat region has a railway with a number of stations and but there are very few good all-weather roads connecting remote areas with these railheads. Freight charges on bad roads are high, fruit and vegetables suffer damage in transit and when they reach the stations, there is the great difficulty of getting wagons on time. If there are no wagons produce must be left in

the open in sun and rain as there are no storehouses. Rail freight rates are high so that the returns obtained by the producer are very low indeed.

Hill Catchment Areas of West Pakistan

General picture

47. The hill catchment areas of West Pakistan lie in the extreme northern part of the wing and comprise Murree and Kahuta Tehsils of Rawalpindi district, Abbottabad and Mansehra tehsils of Hazara district, Kaghan, Swat, Dhir, Chitral, Malakand and Para Chinar areas. Kashmir and Gilgit which are distinct political entities are also part of this area, but are not considered in this report. The area forms the hill catchment of the rivers Indus, Jhelum and their tributaries. It begins with low hills rising from the plains and continues, tier upon tier of increasingly higher ranges, with the highest rising well above the permanent snow line and including some of the world's highest peaks. Apart from a few gentle slopes and plateaux, the region consists of razor-back ridges and narrow steep-sided valleys often with rapid torrents.

The climate varies directly with altitude. Rainfall occurs during both summer and winter and may range from a mean of 10 inches a year in the north-west to over 40 inches in the north.

Timber is found at higher altitudes (usually over 3,000 feet but this varies with rainfall) and in the forest reserves at lower elevations in higher rain-fall areas. In general, the forests at the lower altitudes are confined to the more inaccessible slopes and are usually scrub. Elsewhere the slopes have been denuded of trees and other protective vegetative cover by timber felling and over-grazing.

48. Cultivation is carried on along the streams and river banks and by terracing the hill sides wherever soil conditions permit. With the increase in population more and more of the steeper slopes have been cleared and brought under cultivation. The terraces are made by constructing dry stone walls on the lower side. Little attempt is made to level the lands behind the stone walls and in consequence soil is lost

through erosion and the terraces soon become incapable of raising crops. Such terraces then revert to grazing and more virgin land is cleared for crop production. Extensive areas of hillsides have been denuded of all soil as a result of this practice.

The types of crops grown depend largely upon local climatic conditions. In the upland areas (say 4500 ft. above sea level) crops are grown mainly during summer and include maize, sorghum, small millets, pulses, potatoes, vegetables and fruits such as apricots and apples. Winter crops, where they can be grown, include wheat and sarson. In lower areas (below 4500 ft.) there are two well defined cropping seasons - kharif and rabi.

49. The condition of livestock is generally poor because the holdings are too small to permit the growing of fodder crops. Moreover, in upland regions, no grazing is possible during winter when the land is covered with snow. The subsistence farming carried on demands that the people first meet their own needs, primarily with grain crops, and then consider diversification. But land is so scarce that there is little left for fodder crops, and in consequence, livestock subsists on poor quality straw, poor grazing lands, and the vegetation on plot boundaries and field embankments. Hay is harvested from rough grassland but is always over-mature at time of harvesting and of low quality. The standard of living of the farmers is low and their livestock is even worse off.

Soil Erosion

50. The land is so mismanaged in these catchment areas that accelerated erosion is taking place. The silt laden runoff causes floods and, as most of the rain water is carried rapidly away, the ground water reservoirs are not adequately replenished, and this affects the rate and duration of the perennial flow in streams and rivers. The floods, the silt load and the variation in the perennial flow of water affect adversely land along the river banks in the sub-montane areas and the irrigation system in the plains.

Natural soil conditions have greatly contributed to the present situation, as in many areas, the soils and rocks are unstable and erode rapidly and the summer rainfall usually comes as heavy downpours which are conducive to erosion.

The degree of over-exploitation of land varies from place to place. In the higher hills e.g. Chitral, conditions are better because the population is smaller and the areas are more inaccessible, the timber cannot be easily extracted and there are some excellent forests. In Swat also the condition of the land is good and it contains some of the finest reserved forests in the country. There are possibilities for agricultural development and a potential tourist industry. The Kaghan valley offers similar possibilities. Para Chinar valley in the west is fertile and famous for its orchards and Artemisia (a drug producing plant) but its hillsides are bare. Elsewhere, and particularly in the lower hills and Tribal Areas, the degree of despoilation gives cause for alarm.

Population

51. The area of the region is about 49.1 million acres with a population of about 7.1 million giving a density of 91 per sq. mile but the population is not uniformly distributed. The high hills in the north and the barren slopes have few people, while the remaining areas are densely populated. For instance the Murree Hills have a density of 327 persons per sq. mile and the pressure on the cultivated land is such that there is only 0.45 acre per person.

52. Study shows that the serious problems of these areas are of quite recent origin. Up to 1868 the ratio of human beings and livestock to cultivated area and forest was such that there was a biological balance; there was neither overgrazing nor wholesale destruction of forests. Cultivation was confined to such patches of land as were suitable for the purpose. After 1868, peace brought prosperity and a rapid rise in population. The construction of the Rawalpindi cantonement and the development of the Lahore-Peshawar highway and the North-Western Railway changed the

whole situation. Large quantities of timber were required for these projects and this was provided by the hillside forests. In addition the development of communications made possible the extraction of timber for transportation to other places. To meet these demands forests were cut on an extensive scale with the result that the biological balance was upset and soil erosion began. The first world war increased the demand for timber and further aggravated the problem. With the gradual increase in population, more and more areas unsuited to cultivation were brought under the plough and the cumulative misuse of the land has brought about speedy devastation.

53. The gravity of the situation was realised when, in 1886, it was reported that many hillsides were bare and that the forests were in great danger of disappearing. The former Punjab Government then enacted a law under which the forests were put in the charge of the Forest Department. The reserved forests have been looked after since then but there is still room for improvement. The village or guzara forests are almost completely ruined.

Chittagong Hill Tracts

54. This is a region of some three hundred miles in length and some twenty in depth lying along the Burmese and Indian borders. The land rises in a number of ridges of increasing height starting from its boundary with the Chittagong District. The eastern half of the tract is a thick virgin forest containing a number of species of forest trees, the most useful of which is a hard wood called Garjan which is now being extracted in increasing quantities. Dense bamboo stands all over the area are a prominent feature and provide a raw material for a paper factory at Chandergona and are exported to the heavily populated areas of the delta. Teak is being planted methodically by the Forest Department. It is estimated that the forests, portions of which are only now being surveyed, could produce a sustained yield of forty to fifty thousand tons of timber annually, as against the present rate of about ten to twelve thousand tons.

The western half is mostly a scrub forest but contains some tea estates. Recently attempts have been made on a very small scale to develop portions of it as fruit orchards. A number of small streams can be used for winter irrigation by diversion or even damming.

55. Rainfall is one hundred inches per annum and falls almost entirely in the summer season, from April to October. The population is very much lower than in any other part of East Pakistan, having fifty seven per square mile. They mostly belong to the Chakma tribe.

Along the river banks throughout the region and in patches elsewhere, there is permanent cultivation of crops, the chief of which are rice and sugarcane, with oilseeds during the winter season. Small tracts are also planted with tobacco, vegetables, bananas and other fruits. In addition to this, many tribesmen from further north, where they grow such fruits as oranges, and bananas come down the rivers to the lower hills and practice jhuming. The usual custom is to select a piece of land, a small hillock or a gentle slope and to cut the trees and scrub during the winter and allow them to dry. Just before the rains are due in March or April, the dry vegetation is burned and the ashes scattered as fertilizer. As soon as the rains set in crops, mainly rice, cotton and vegetables, are sown, usually as a mixture. After two or three crops, when the fertility of the soil is almost exhausted the land is abandoned and allowed to revert to jungle. Sometimes, in cooperation with the Forest Department, it is planted with teak before being left. Uncontrolled jhuming in some areas is causing serious soil erosion, and injuring the land as well as the forest.

Communications and marketing

56. Communications are very limited, there is no railway and few all-weather roads. Rivers are used to float produce to the market but many of the smaller streams are not navigable throughout the year. Transportation may be by boat or by bamboo rafts, if the latter are used they find a ready sale when the market is reached. In any case, transport is very slow and quantities of fruit and vegetables are spoilt

before they can be sold. In some of the more remote valleys considerable quantities of fruit cannot be moved out. There is at present an almost complete lack of any good marketing facilities within the area."

We give importance to this area as it is the only area in East Pakistan where it is possible to organize a planned development of additional land. Much will depend upon a systematic survey of the potentialities. The problem of resettling the hill tribes and of teaching them the techniques of settled agriculture will have to be solved before any headway can be made and land allocated to others.

Conclusions

57. Certain significant facts emerge outstandingly in this survey of the farmers' position throughout the country :- the critical position in East Pakistan owing to population pressure on very small holdings; the critical position in the irrigated plains in West Pakistan owing to salinity and waterlogging; the overcrowding, erosion and hazardous dependence on rain in the sub-montane areas; the misuse of the huge range lands and the smallness of their contribution to the country's economy; the denundation in the hill catchments and the flood hazards which result from it; the urgent need for planned land use in the Chittagong Hill Tracts. These facts present a sombre overall picture at a time when the biggest national priority is increased agricultural production to feed a rapidly increasing population.

58. When the focus is altered from the overall view to the detail of the individual farmer's position, with a few notable exceptions, the picture revealed is equally sombre - low yields; very small incomes; little to spare for capital investment; in many places poor diet and health; in many places a land tenure system which operates as a disincentive to extra effort in work or money; in many places sub-division and fragmentation eating away the very basis of satisfactory farming. Many of the problems - population pressure, floods, waterlogging, salinity, land tenure - are beyond the competence of individuals to alter, and the overall environment discourages risk, fosters inclination to conservative ways and makes

farmers disinclined or unable to change to new techniques necessary to increase production.

59. Nevertheless it is to the farmer that the nation has to look for effective participation and cooperation in any plan for increased agricultural production, and in spite of his discouraging conditions many a Pakistani farmer is fully alive to the needs of the situation, is anxious to find a way out to better his lot, and is not unresponsive to new techniques provided ways and means for their practical application are brought within his reach and he finds them beneficial. Equally, in spite of the present sombre overall picture of the state of agriculture, the country has natural assets which warrant considerable optimism if only they can be more satisfactorily used. The East Wing has been endowed with a very fertile soil and a climate favourable to the production of a large variety of food and cash crops. It has also a wonderful wealth of river water. The West Wing equally has been endowed with good soil and a water wealth already developed into the largest canal irrigated system in the world. It has also large areas of land at present sparsely populated, available for further irrigation. Outside the irrigated areas it has a vast range of country which, under proper conditions of use and development, could support a much greater livestock population and in places diversification in greater production of crops and fruit. Finally the very fact that present yields are so low is a hopeful one for it means that if modern techniques could be applied the range of potential increase could be substantial.

60. We have been anxious in this chapter to make clear that the present position of the farmer and of agriculture in general in the country is a very poor one and that the present prospect is downhill just when a tremendous uphill effort is demanded. But this does not mean that the position is hopeless. What it does mean is that the right techniques must be discovered and applied for altering this state of affairs immediately. What these techniques are, how to get rid of the difficulties which discourage farmers from using them, and what instrument of organization can best get them to use them, are the theme of the following chapters.

PART III

THE POSSIBILITIES AND HANDICAPS

CHAPTER 5

TECHNIQUES FOR INCREASING PRODUCTION

In spite of the natural advantages which we have described and the manpower resources available, the country's agricultural production has remained almost static over the last ten years. Yields of crops are amongst the lowest in the world and show no upward trend. The problem before us is how to bring about a great increase in production. It is not a new problem in the country nor is the answer likely to be a completely new one. Commissions and Committees from the Royal Commission on Agriculture in 1928 to the Agricultural Enquiry Committee of 1952 (the Boyd-Orr Committee) have all agreed that production could be greatly increased and have suggested various measures to achieve this. The measures recommended have included all the known methods which have been successful elsewhere and recently the Agricultural Production Team sponsored by the Ford Foundation (Government of India, 1959) has found no reason to make different recommendations. They have concentrated, as we shall, upon certain major factors, such as the evolution, production and distribution of improved seeds, the popularisation and supply of fertilizer, the control of pests and diseases, the use of improved implements and machinery for the better preparation of the land, the proper use of irrigation water, the better breeding, feeding and management of livestock, and the provision of adequate credit for making use of these factors They have also emphasised, as we shall emphasise, the need for a good extension service, for a strong basis of agricultural research, education and training, and for the development of sound cooperatives. They have stressed, as we shall stress, the importance of better communications and marketing, and of price support. Many of the techniques recommended are based on the experience of successful methods in this and other countries.

2. It has seemed to us that the chief problem in finding a remedy for Pakistan's agriculture does not lie so much in the discovery of prescriptions

different from those of previous commissions or from those that are being applied elsewhere, as in finding a way for their effective implementation. This has been the point of failure in the past and must be the central point of attention in this report. We shall be dealing, in the chapter which follows this, with the all-important question of a competent instrument for implementation, and shall examine there the state of the present government machinery.

3. We propose to deal separately with the problems of different areas. The cultivated areas of the country represent much the biggest sector of the problem and, in spite of regional differences, have a great many aspects in common. They are accordingly treated as a single region here, and constitute the first heading for consideration. The new colonisation areas of West Pakistan have much in common with the existing cultivated areas but are treated separately as the second heading, because they offer important organisational opportunities not easy to apply in already cultivated areas. The third heading deals with the range lands, and the fourth with the hill catchment areas of West Pakistan. A fifth heading covers certain areas and subjects requiring special consideration. Inevitably there is some overlapping under these headings.

The broad headings under which the techniques for increasing production will be discussed in this chapter are thus as follows:-

Existing Cultivated Areas
New Colonisation Areas
Range Lands
Hill Catchment Areas
Areas & Subjects Requiring Special Consideration

Under these, particular techniques are discussed in detail.

Existing Cultivated Areas

4. This heading covers the vast bulk of the country's present producing areas and of its population. It comprises most of East Pakistan, the irrigated plains of West Pakistan, and the sub-montane and barani areas of West Pakistan.

5. In the huge region under this main heading we are dividing the

subject of the techniques for increasing production into two major aspects, viz:-

A. Techniques which can be applied without altering the present patterns of land use.

B. Techniques demanding alterations in present patterns of land use.

A. Techniques which can be applied without altering the present patterns of land use.

The Five Firsts

6. There are five techniques which in this report we call the "five firsts". They are considered here first and are so called precisely because they can all be applied without altering present patterns of land use. The "five firsts" are:-

Better Seed
Fertilizer
Plant Protection
Better Cultivation Techniques
and Short & Medium Term Credit

It may be thought that irrigation should be included among the "firsts" because of its immense importance to production. We have not included it at this point because its proper and economical use almost invariably involves changes in existing land use patterns and it will be discussed under that heading.

7. There are two important facts about the "five firsts". The first is their interdependence. The second is the need to bring them as a package deal within easy reach of the farmer. While each item alone can effect some increase in production, it is their combined application which really brings substantial results and the benefits derived from any one of them in isolation are often frustrated by the absence of the others. Better seeds and fertilizer may yield poor results if the land is not properly prepared and kept clean of weeds, and all may be useless if the crop is not protected from pests. Moreover, the provision of these aids is unavailing if the farmer cannot use them for lack of credit.

8. It is the use of these particular aids in combination which so distinguishes the very high yields now obtained in advanced farming

countries, and that these are by no means unattainable under local conditions has been illustrated by the high yields obtained on farmers' lands. The average maize yield in Pakistan is 10 maunds to the acre. The average yield obtained when all the improved techniques were used was 36 maunds on poor land and 63 maunds on good land. The highest yield obtained on farmer's land was 108 maunds and on a government farm 121 maunds to the acre. These figures give some idea of the range of improvement which might be looked for if improved methods are adopted. We were told of similar striking increases in rice yields in East Pakistan where combinations of such improved techniques were used. Individually, in many parts of the country, improved seeds have given on an average a 15-20 per cent increase, better cultural practices 25-30 per cent, fertilizers 40-50 per cent and plant protection measures 15-20 per cent, but the record yields obtained in Pakistan by individual farmers and in government farms (about 50 maunds per acre for wheat, 90 maunds for paddy, 40 maunds for cotton and 2,000 maunds for sugarcane) bear ample testimony to the fact that if these different factors of production are brought into a harmonious combination, yields can be increased manifold.

9. The second important fact about the "five firsts" is the need to bring them as a package deal to the farmers' doors. It might be thought that this was self-evident and simple. In point of fact, it involves a revolution in ideas. Organisationally, the significance of the package deal concept, reflecting the importance of supplying all the items simultaneously, has not so far been fully appreciated, nor has the need to get them to the farmer. These are matters of implementation which will come up for particular discussion in the following chapter. But before this, it is important to understand what is involved in supplying the "five firsts", and each item must be further examined for that purpose.

Better Seed

Introduction

10. The use of better seeds means primarily growing superior varieties of crop plants adapted to particular areas and conditions. Higher

yield is a primary objective, but the quality of the crop and its trueness to type must also be considered. These quality factors may be of vital importance, as with cotton and jute which must conform to prescribed standards if top prices are to be obtained, and it is to be expected that with increasing sophistication in the consumers' market, there will be a greater demand also for top quality of crops such as wheat, rice, fruit and vegetables. In addition to the factors of yield, quality and trueness to type, it is most important that the actual seed sown by the farmer should be of good quality; it should be sound, free from disease, pests, damaged seeds and extraneous matter.

Producing the improved variety

11. The first consideration is to obtain varieties adapted to local conditions. Improved varieties may be obtained by selection within existing crops, by developing entirely new varieties through hybridization or by introducing established varieties from other countries. The duty of the plant breeder is never ending, he must continually seek new varieties which will give higher yield or better quality, or which will respond to changes in environment (in this connection response to higher fertility with an increasing use of fertilizers will be particularly important), or resistance to disease or pests, or to meet changes in demand from the consumer market.

12. A problem in the past has been that breeders' activities have sometimes ended when they have produced better varieties and they have had little or no responsibility for ensuring that these varieties were multiplied, or that they were kept pure. Unless breeders are in touch with the work of multiplication at all stages, therefore, it will be difficult to maintain standards of purity. Moreover, they must be continually presenting new varieties to the multiplication programme and advising on withdrawal of old varieties.

13. However, if production of quality seeds is to play its role in increasing crop production in the near future, it will not be possible to

depend upon the production of entirely new varieties. For example, it may take 12-15 years from the date of hybridization to the time when a new variety of wheat will be available in bulk for distribution to farmers. While the selection of improved varieties from local stock or the importation of improved and established varieties from other countries could give results in a much shorter time, even these techniques will take longer than is required by a rapid development programme. In such circumstances, reliance must be placed upon varieties known to be adapted to local conditions. These may be established local varieties from existing breeding programmes or even good 'farmers' varieties, which are well worth the effort of multiplication in the early days of development. Such varieties may be discarded when improved strains become available, but in the meantime, growers can be offered sound seed which gives good results.

Existing production and services

14. A large number of varieties of most of the crop plants is to be found in each wing. In East Pakistan, for example, a large number of varieties of rice are recognised in the Aus, Aman and Boro crops, and additional strains are found in the West wing. There are a few varieties of wheat in the East wing and many more in the West. In both wings regional adaptability is recognised for a number of varieties of both rice and wheat. A recent introduction is the wheat variety Dirk from Australia which illustrates the possibility of short-circuiting a varietal improvement programme by the importation of established varieties. Similarly with jute, cotton and other crops , many varieties are available which should be adequate to meet a breeder's programme though the possibilities of introducing new qualities from abroad should not be overlooked.

15. Data available on the distribution of improved seeds show that the production falls very far short of requirements and that the quality of the seed issued is far from satisfactory.

Future needs

16. Obviously, in drawing up a breeding programme, it would be

wise to concentrate at the beginning on the major crops and the number of varieties to be grown should be kept to a minimum, otherwise handling and the prevention of mixture will offer many problems. There is, however, a very considerable range of environments within the country, particularly in West Pakistan, and it is essential that the varieties should be suited to the area in which they are grown. While this last point may be widely appreciated, a number of cases has been cited where varieties suited to one set of conditions have been distributed in areas presenting completely different conditions.

The following calculations give some indication of the eventual scale of activities required:-

> In the case of wheat, if it is assumed that the farmer needs to change his seed only once in five years and the total area of wheat grown is 12 million acres, at a seed rate of 40 seers per acre, the quantity required would be:-
>
> $\frac{12,000,000}{5} \times \frac{40}{1,100}$ = 90,000 tons approximately
>
> This would require 126,000 acres of seed crops at a yield of 20 maunds to the acre.
>
> A similar calculation for rice would give:-
>
> 69,000 tons and 97,000 acres (at 25 seers per a yield of 20 maunds per acre).

While these figures may be subject to considerable modification and should not be regarded as actual production targets they illustrate the magnitude of the quantities involved.

The seed organisation in Pakistan

17. Much of the present seed production effort is concentrated on government seed farms, but the standard of efficiency there is low. This low efficiency can be attributed to a number of causes including inadequate budgets, delayed financial sanctions, lack of delegation of authority even in small matters, lack of machinery for processing, collection and distribution, the absence of seed testing facilities and of any form of legal control of standards.

18. Seed multiplication schemes involving the cooperation of registered growers are in operation in both the East and West wings but, by

and large, they have not been a success owing to lack of efficient organisation. Interesting seed bank and seed exchange schemes are to be found in the Rawalpindi area, but they are at present small in scope, both as regards quantity and species handled. The present schemes for seed production are obviously inadequate and need drastic reorganisation and expansion.

19. It may be useful at this stage when considering what type of seed multiplication scheme could be adopted in Pakistan to describe very briefly some forms of organisation for seed multiplication found in tother countries.

Methods adopted in other countries

(i) Government distribution

In some countries less developed in this respect, governments assume responsibility for the proper distribution of high quality seed, multiplied on state farms. Turkey and Egypt have adopted this method.

(ii) Cooperatives

In a great number of countries, seed growers' associations and farmers' cooperatives play a part. Most of the wholesale and some of the retail cooperatives have established seed cleaning plants and storage accommodation, and process and market the seed produced by their members. Others merely buy the seed processed and pack it for distribution.

(iii) Private enterprise

In many countries, the bulk of high quality seed is supplied to the farmers by independent private companies, firms or agencies as free enterprise. Many seed firms merchandise their seeds under private registered trade marks, but they also may have a close relationship with official research stations.

The successful seed merchant must have as good a knowledge of the technical and technological phases of seed production as the government scientist, and reliability and carefulness are of equal importance if he is to operate successfully.

20. None of these methods is suited to present day conditions in Pakistan. Private seed firms hardly exist and there is no hope that they could develop quickly and operate on the scale required. Cooperative organisations are, as yet, quite incapable of tackling such a task. Much of the present seed production effort is concentrated in government seed farms but the standard of efficiency is low.

Developing a seed scheme

21. An efficient seeds organisation would have to cover all the operations involved in the movement of seeds from the time they leave the producer until they are delivered to the consumer. It would involve the purchase of the seed from the grower, its assembly at a central point for processing (this entails sampling, cleaning to remove foreign matter, broken seeds, weed seeds, etc.); drying, grading, treating with plant protection chemicals; bagging and packing; labelling and sealing; storing and distribution either direct to consumers or to agents for final disposal.

22. From tentative estimates of total seed requirements of major crops, and indications of the scanty area at present available as Government Seed Farms, it is obvious that more land will have to be devoted to the production of seed and this is best done by contracting with registered growers. This approach is adopted in most countries and is already appreciated in Pakistan. Under such a scheme there would, therefore, be three strata of production: (a) seed production by the breeder, (b) multiplication on Government Seed Farms, & (c) multiplication by registered growers.

As an illustration of the quantities involved, in the case of wheat approximate quantities required at the various stages in West Pakistan would be for (a) 5 tons per variety, for (b) 5,000 tons total of all varieties (this might require a number of generations of multiplication on the Government Farms), and for (c) 90,000 tons.

23. Registered growers would have to be carefully selected, because ultimately the success of the scheme would depend upon their honesty and

cooperation. Since they would incur extra expense in producing seed crops they should be paid a premium for doing so. In certain circumstances the willing cooperation of the grower may not be an adequate safeguard, as in the production of cross-pollinated species, where a nearby crop of the same variety might ruin the varietal purity. In these circumstances it may be necessary to compel all the farmers of a particular area to grow only one variety and use the whole area for seed multiplication. But even where there is no risk of cross-pollination there are definite advantages in such zoning - it can reduce both the risk of mechanical mixture and the cost of collection and transport. In East Pakistan where there are few large growers it will be impossible to deal with many thousand of small-holders and dealing with a village community, possibly as a seed growers' cooperative, would be the only feasible approach.

Special crops

24. Discussion has so far been concerned with the general problems associated with production of seed of the major agricultural crops, but there will be certain crops which will require special treatment. These include, potatoes, sugarcane, tree-seedlings, vegetables and cotton. The first three have one thing in common, they are not multiplied in the form of seed, but are propagated vegetatively.

(i) Potatoes

25. The major problem with potato seed is the incidence of degeneration diseases caused by viruses which are passed on from one "generation" to the next, usually with increasing virulence. These virus diseases are spread, for the most part, from plant to plant by insect vectors and the method of control found practical is to grow "seed" crops in areas where the population of vectors is low. Suitable areas have high winds or high rainfall, or both, which prevent the migration of the insects. Such conditions exist usually in upland areas, but frequently coastal regions are equally suitable.

This means that specialised seed potato areas must be designated and special programmes evolved for them. Of particular importance will

be the provision of cold stores in which the potatoes can be held over the hot months without deterioration. At present the place of the breeder in the seed programme must be taken by the country from which the "seed" of certified quality is imported. Later consideration could be given to expanding the small breeding programmes now operating locally.

(ii) Sugarcane

26. Sugarcane offers few difficulties, but the future programme will demand organisation of the multiplication process from the breeder to the grower. These stages should be carried out in the usual strata of production. A premium for high sugar content should be paid by factories to encourage the use of better varieties.

(iii) Tree seedlings

27. Nursery organisation, involving selection of varieties (and of stocks where necessary) and distribution to growers, demands different skills and knowledge from those required for seed production. At present in Pakistan, fruit production is not at a high level of efficiency as is shown by the wide variations in quality and the great mixtures of varieties to be found in most fruit plots. These are serious deterrents to high production and dependable quality, and the producer loses in consequence.

The importance of providing the grower with the best variety must be considered in its long term aspects too. It takes a number of years for a tree to come into fruition and if, when it does, it is found to bear inferior fruit, the grower may be reluctant either to cut it out or to regraft as this would entail considerable loss. If he does not do so, then the production will continue to be inferior throughout the tree's bearing life which might be several decades.

(iv) Vegetables

28. Most vegetables are propagated from seed and most are cross-pollinated so that special precautions are needed in seed raising. In view of the extreme specialisation involved, it will probably not be advisable to launch immediately into a full scale research and development programme for vegetable seeds. Experimental work could first be carried out to

compare the varieties available from reputable seed organisations overseas with established local varieties where they exist. Where foreign varieties are found suitable, they could be imported in bulk. At the same time trials could be made on the multiplication of these improved varieties in Pakistan. The overseas producer could continue to supply the nucleus seed, as the breeder provides it in the multiplication of the major farm seeds.

(v) Cotton

29. As this is a cross-pollinated crop, it will be essential to grow varieties in defined zones if purity is to be maintained. There is a zoning plan in operation in West Pakistan already. This should continue and appropriate regulations should be strictly enforced. In addition to mixing in the field, there is the danger of mixing at the gin, and while zoning can reduce this risk the real solution will probably lie in the operation of gins by the seed multiplication organisation.

(vi) Hybrid maize

30. The present annual production of maize in Pakistan amounts to nearly 500,000 tons of grain at an average yield of about 11.5 maunds per acre. This yield could be very greatly increased by the planting of hybrid maize seed particularly if improved cultural practices were used at the same time. Field tests of hybrid varieties in former NWFP have shown very large increases in yield over local open pollinated varieties.

The production of hybrid maize is a highly specialised operation and requires a sustained supply of high quality "inbred" and single-cross seed. For each 1,000 acres planted to hybrid maize, 200 maunds of double-cross seed is required. Three seasons of successful uninterrupted stock seed production are necessary to furnish the double-cross seed to be planted by the farmer, and in order to get full advantage of the hybrid vigour, it is necessary to use new double-cross seed each year. A good start has been made at Peshawar with American "inbred" lines, and at Lyallpur with local "inbred" lines. About 6,000 maunds of hybrid maize

were offered to farmers during the present Kharif season, but part of this was purchased from abroad. Requirements for the present total maize acreage of West Pakistan is about 175,000 maunds of seed.

Plans are under way in cooperation with I. C. A. to attempt to reach this goal by 1965. The necessary machinery, including grain driers and seed cleaning equipment, is already here. Government should give high priority to this project.

Seed control

31. Seed quality is determined by purity (extent of freedom from inert matter, admixtures with seed of other crops and weeds, and other varieties of the same crop), germination capacity, seed health (degree of freedom from seed borne diseases and pest infestation), seed moisture (in relation to keeping quality), seed weight (a measure of quality) and genetical conformity. Control of these factors can best be ensured by laboratory testing, seed certification and legislation.

In the laboratory, purity tests on germination, seed health, moisture, weight and other characteristics should be made. That this is a necessary adjunct to a programme of seed multiplication has been proved over and over again in many different countries and it is essential that there should be adequately equipped laboratories and trained staff to undertake such testing.

As regards certification, if a reliable guarantee as to the genetical quality of seed is to be given, seed crops must be examined in the field and all stages of the production of the seed, including its final preparation for the market, must be properly supervised.

Quite obviously the prescribed standards for seed control can be enforced only if there is a Seeds Law which gives the necessary authority. Such seeds laws have been promulgated in many countries and there are now international agreements on standards to be adopted for seed moving in international trade. Pakistan should make legal provision for seed control and that a start be made in framing such laws as soon as possible. In the early stages of seed multiplication, standards set too high might prove

n embarrassment, but there should be provision to permit a raising standards as required. It would be well to limit the provisions of the In the initial stages to seeds of the more important crops and to extend the cover gradually as the scheme progresses.

32. In summary, a well organised seed production scheme implies a number of essentials:

There must be an efficient research programme to provide improved varieties, raise quality standards and to meet new needs.

Multiplication of these improved varieties demands an efficient organisation to obtain high and good quality production from foundation seed farms. There must be facilities to supply and supervise registered growers, and to collect, clean, disinfect, store, package and distribute the seed. There must also be flexibility in finance and in recruitment and control of staff to carry out what are in fact commercial duties in a businesslike manner.

Legislation governing standards of seed quality is essential and should be administered by an official body such as the Ministry of Food & Agriculture, which would require the establishment of official seed testing laboratories for the purpose. Field certification could be carried out by the seeds' organisation but this too should be subject to official checking.

Fertilizer

Importance of Fertilizer

33. Crops continually remove from the soil the nutrients that are essential for their growth and nourishment. The most important of these elements, and those that are required in bulk, are nitrogen, phosphorus and potassium. In order to maintain soil fertility and so to provide the basis for continued plant growth, these nutrients must be replaced in the soil. Since the natural recuperation of these elements is a slow process, artificial fertilizers have to be applied to maintain the productivity of the land. Unless the plant nutrient content of the soil is adequate, other factors of increased production like better seeds, water, or better land

preparation cannot bring about the desired results. The use of fertilizer is,therefore,taken to be a prime factor in production. It can give a large and immediate increase in yield and hence receives top priority in all agricultural development programmes. In all agriculturally advanced countries, the use of fertilizer is now almost universal and through its use per acre yield of crops has been substantially increased. Fertilizer use in Pakistan needs special emphasis because the soils are generally, like other tropical soils, deficient in plant nutrients, especially nitrogen and phosphorus.

Organic Manures

34. Recommendation of the use of artificial fertilizers should not be taken to imply neglect of organic manures like farm manures and compost made from village refuse and town wastes. Though farm manure is not a substitute for chemical fertilizer, its value for improving the soil structure and furnishing much needed humus to the soil makes it a useful supplement. This is particularly important as Pakistan soils are low in organic matter content. There is great need,therefore,to conserve and make fuller use of farm manure, to encourage extensive preparation of compost from refuse and also to practise green manuring. The method of compost making from village wastes, weeds, and water hyacinth is now fairly standardised, but an intensive campaign is required to popularise it. Night soil, municipal garbage, slaughterhouse wastes, etc., should be composted in all municipal areas. Farmers should be educated in conserving farm manure and, in order to prevent the extensive burning of cow dung as fuel, a programme of plantation of quick growing trees in homestead lands is desirable. We do not wish to undervalue any of these activities, but the total contribution of organic manure is at present very small and is unlikely to rise substantially without major changes in farming patterns, which are themselves dependent upon substantial rises in the yield per acre. It is upon the use of artificial fertilizers that the opportunity for such rises primarily depends.

Present Use of Fertilizers

35. The use of artificial fertilizers by Pakistani farmers is a very recent practice. In 1952-53 the total quantity of fertilizer (ammonium sulphate) used in the country was about 14,000 tons. This provided an average of half a pound of fertilizer per cultivated acre whereas in many countries the figure exceeds 300 lb. During the last few years fertilizer use has, however, become gradually more popular with farmers but consumption is still very small as compared with the needs of both soils and crops. In 1959-60, the consumption of nitrogenous fertilizer (ammonium sulphate equivalent) was 135,000 tons which is roughly equivalent to 5 lb. per cultivated acre. The use of phosphatic and potassic fertilizers has been negligible. Fertilizer use can, therefore, be stepped up immensely, and must be greatly expanded to attain even the production goals set in the Second Five Year Plan.

Fertilizer Response

36. Experimental evidence from both the wings of Pakistan shows that production can be increased to an extent of about 50 per cent by applying fertilizers in proper combination. In East Pakistan, simple trials in cultivators' plots on the three paddy crops of the province conducted for three years and covering the different soil-climate tracts have shown that paddy is highly responsive to fertilizers. Though nitrogenous fertilizer alone gives quite a satisfactory response, its combination with phosphatic fertilizer has given 43-80 per cent increase in yield in a large part of the province (Brahmaputra alluvium, Gangetic alluvium and salinecoastal tracts) while in certain other tracts (Teesta Silt, Madhupur and Barind tracts) the combination of nitrogen with phosphatic and potassic fertilizers has increased the yield by 57-100 per cent. Similar trials in West Pakistan on rice and wheat have shown that nitrogenous fertilizer alone can give an increased yield of 25-30 per cent. In the barani areas (hilly and sub-mountane regions) nitrogen and phosphorus in combination has raised the yield by about 50 per cent. In areas of high rainfall potash also has been found to give a response.

Survey and Trials

37. These trials have shown that there is considerable scope for increasing production by extending the use of fertilizers in the greater part of the country and that from both yield and profit points of view, mixed fertilizers, particularly nitrogen and phosphorus combinations, are to be preferred. Considerably more experimental work is, however, necessary, to find out the right kind, dose, combination, pattern, and manner and time of its application in different soil tracts for different crops. Fuller information on these aspects is necessary both from the standpoint of efficiency and economics and also for the correct guidance of the farmers of different areas in the proper use of fertilizer. For this purpose the existing organisations of Soil Survey and Rapid Soil Fertility Survey must be considerably expanded and these surveys will have to be supplemented by laboratory soil studies so that precise information may be obtained for the better management of the soil under different sets of conditions such as alkalinity, salinity, waterlogging, acidity, and swampiness. Emphasis will also have to be laid on the study of trace elements which, when applied in addition to the major fertilizers, may, in certain deficient areas, bring about yet further increases in yield.

Future Programme

38. Meantime, the level of fertilizer use must be stepped up rapidly on the basis of existing information. By 1961-62, nitrogenous fertilizer amounting to 550,000 tons of ammonium sulphate equivalent will be produced within the country. This includes 50,000 tons of ammonium sulphate from Daudkhel, 117,000 tons of urea from Fenchuganj, 103,000 tons of urea and 59,000 tons of ammonium nitrate from Multan and is nearly four times the consumption of nitrogen in 1959-60. In view of the response given by the phosphatic fertilizer in large parts of the country, particularly in East Pakistan, even at a conservative estimate 100,000 tons of superphosphate should be made available in the first phase when the above quantity of nitrogenous fertilizer will be produced internally. The current

consumption of superphosphate is only about 3,000 tons annually, and hence there should be a special drive for its popularisation and supply. The Lyallpur factory produces 6,000 tons of superphosphate per annum, but it is understood that its capacity can be doubled and even trebled by running in two or three shifts. The remaining quantity of superphosphate or other phosphate carriers will either have to be produced locally by increasing manufacturing capacity or imported. It is thus evident that even to consume home-produced fertilizers and to introduce balanced fertilizer use in the interest of maximum production, the total fertilizer consumption will have to be multiplied almost five times within the next two or three years.

39. It may be pointed out here that, calculating on the basis of plant food removed by different crops from an acre of land, the cropped area of the country will require a replacement of nearly four million tons of nitrogenous fertilizer alone in terms of ammonium sulphate. Assuming that up to 25 per cent of this amount is returned to the soil in the form of plant and animal residues, animal excreta, silt deposition, biological and chemical fixation, the net requirement for replacement would come to about 3,000,000 tons. It would thus appear that the present target of 550,000 tons is less than one-fifth of the actual fertilizer need of the country. In order to achieve even this modest target a tremendous effort will have to be made to increase the intensity of fertilizer use where it is already popular and to extend its use in other areas as rapidly as possible.

Price Subsidy

40. Although the use of fertilizer is steadily gaining in popularity, the actual demonstration of fertilizer use at the farm level has not been so far on a scale sufficient to induce all farmers to use it. In places pre judice and apathy, often illfounded, still obtain, and incentives are needed to overcome them. Though it has been found that under normal conditions the proper use of fertilizer gives an economic return to the farmer, he is

often reluctant to use it if he does not think its price is sufficiently low. In the past, government has subsidised fertilizer to various degrees. The rate of subsidy has, however, been so variable from year to year and changed at such short notice that much of the expected impact of the subsidy was lost. In 1952-53 fertilizer was sold at a subsidy of 60 per cent, in 1953-54 the subsidy was raised to 66 per cent, but in 1954-55 it was reduced to 50 per cent. It was again raised in 1955-56 to 66 per cent. In 1956-57 and 1957-58 it was 66% in East Pakistan and 58% in West Pakistan. The rate was reduced to 40 per cent in 1958-59 and this sudden lowering of the subsidy gave a serious setback to fertilizer consumption throughout the country and imported fertilizers were lying in the government godowns in both the wings in large quantities. Fertilizer use is still in its initial phase and to ensure widespread distribution, it is desirable that the subsidy should continue and that the rate should remain unchanged over a number of years so that the farmer may not be left in doubt as to the investment he has to make and may thus plan ahead. In the Interim Report submitted by the Commission, the question of subsidy was given careful consideration and recommendations were made for fixing the price of various types of fertilizers at levels which will give the necessary incentive to farmers for their wider use. These rates should be maintained for at least five years after which the position should be reviewed and a policy for the gradual scaling down of the subsidy be adopted until such time as increased production leading to higher incomes enables farmers to purchase fertilizer at its full price.

Other Incentives

41. Apart from the desirability of keeping fertilizer cheap by subsidy in the early years so that a high retail price may not discourage its use, concurrent attention must be paid to other deterrents already referred to in the chapter on "The Present Position of the Farmer" (Chapter 4). It is obvious that fertilizer use cannot be economically attractive on lands where floods are liable to wash it away, where irrigation water is

insufficient or where salinity is in any case affecting the capacity of the land to produce a good crop. It is also obvious that a share-cropper is unlikely to find its use attractive if he has to pay for the whole of it himself but give half the benefit to the owner of the land.

Supply Organisation

42. Even where these disincentives do not apply, or are removed, the popularisation of fertilizer and its provision to a very large number of farmers at the right time and of the right kind will require, as in the case of seed, a first-rate, streamlined organisation operating in a businesslike manner. It will also require provision of numerous satisfactory stores with the relevant stores control staff, within easy reach of the farmers and an energetic extension staff in the field to demonstrate its value and popularise its use. For a highly hygroscopic fertilizer like urea, especially under East Pakistan conditions, weather-proof stores will be particularly important and damp-proof bagging materials may have to be used in addition. This conjoint effort at the field level must be backed by a research programme of sufficient intensity to provide newer knowledge of fertilizer use and to solve local soil problems peculiar to certain areas. The essential condition for success will be efficient management and the integration of the fertilizer programme with the other items of the "five firsts". We repeat this because, as with better seeds, there is a tendency in the country to regard the provision of fertilizer as a comparatively simple task. At present there is very little first class storage in the country and the provision of fertilizer is still another duty added to the burden of the extension staff who have no special stores staff to help them. It is clear that fertilizer can be a most powerful aid to production but a strong organisation is essential to get it used on the scale and at the speed required.

Plant Protection

Incidence of Attack

43. Diseases and insect pests of crops are of regular occurrence in

Pakistan. The extent and severity of infestation vary a great deal but even at a conservative estimate it would appear that 10 to 15 per cent of the potential yield of all cultivated crops is lost through insect pests and diseases even when there are no large scale outbreaks. At times of widespread infestation the loss in the affected areas goes up to 50 to 100 per cent, often resulting in complete crop failure or a very poor harvest. The attack of swarming caterpillar and ear cutting caterpillar on rice in East Pakistan in 1954 and the following few years was partly responsible for the serious food shortage that occurred in that province in those years. In West Pakistan the rice stemborer has been responsible for causing damage to the rice crop to the extent of over 50 per cent in successive years in a number of districts. Besides loss in the fields, 5 to 10 per cent damage is also caused by pest to grains in stores.

44. By adopting efficient plant protection measures it is possible to prevent or substantially reduce this damage in fields and stores. Campaigns organised in the past have amply demonstrated that suitable measures taken in time give increased production and definite financial benefit to the farmer. According to the estimates of the Planning Commission in the Second Five Year Plan, plant protection is likely to contribute 20 per cent of the increased production in foodgrains, 39 per cent in cotton, 18 per cent in jute, 48 per cent in tea, 12 per cent in sugarcane and 13 per cent in fruits and vegetables.

45. Certain surveys made by the Central Directorate of Plant Protection have shown that the protection of crops like rice, sugarcane, cotton and potatoes is highly profitable and the investment made in such operations is amply repaid by increased yield and in some cases by better quality crops. In any scheme of increased production, therefore, plant protection assumes great significance. When modern aids to production are used for raising a good crop with the investment of considerable money in the form of seeds, fertilizers, water and labour, it would be folly to allow the crop to be eaten away by pests and all the labour to go waste when

measures for preventing such a loss are known and can be made accessible to the farmers.

Present Status

46. During the first years after Independence plant protection was practically unknown and it was only during the first Five Year Plan that plant protection work was given due importance by the provincial and the Central governments as a result of which an operational plant protection service came into existence. During the last few years considerable expansion has taken place in the plant protection organisation and in field operations. It is estimated that during 1959-60 about 1.3 million acres under major crops have been treated by ground and aerial operations as against 200,000 acres in 1954-55. Seeds for about 3,000,000 acres have also been treated with preventive chemicals during this year as against 300,000 acres sown with treated seeds in 1954-55.

47. These figures are still small compared with the huge areas involved and in order that the farmer may be benefited by applying plant protection measures to his crops on an intensive scale the government should provide an efficient plant protection service down to the farmers' level. Effective fighting of pests in all cropped areas and stores is a tremendous task and no government organisation is big enough to undertake complete responsibility for this. Growers must therefore see to the protection of their own crops in the fields and their produce in stores, with the help and guidance rendered by the government organisations. Farmers all over the country are not fully aware of the benefits that accrue from the money and labour spent in plant protection practices, neither are they conversant with the methods and techniques. For an effective programme it would, therefore, be necessary for the knowledge and techniques of fighting pests and diseases to be made known to the individual farmer and the necessary chemicals and equipment made available to him in time.

Organisation

48. Such a large and important task makes much the same demands as the provision of fertilizer and better seeds. There must be continuous

and widespread research to identify pests, investigate their life cycle and habits and discover the appropriate techniques for their destruction. There must be experiment to ascertain the best time for, and the most economical use of pesticides. There must be close contact between the research worker and the man in the field. There is the same need for th timely ordering of materials and for a suitably staffed chain of stores down to the farmers' level. There is the same need for an adequate and energetic extension staff to demonstrate pest control and persuade farmers to apply it. There is the same need, if this is to be economically sound, to integrate plant protection with the other "four firsts" so that really high yields result to pay off the investment involved.

49. Although valuable experience has been gained in this field in recent years the burden of operation still falls almost entirely upon a government plant protection service and very little is as yet done by farmers themselves. No doubt this is partly due to the fact that control measures have necessarily to be complete and extensive since an untreat ed area forms a focus for reinfestation and may nullify the treatment. No doubt it is also due to the fact that many pesticides are dangerous in inex perienced hands and that it is not easy to teach an illiterate community how to mix and apply them nor to enable them to acquire the large numbe of machines needed for applying the treatment and teach them to look after them properly. Treatment on behalf of a community of farmers ma well be the best method where crops are in solid blocks which permit the economic use of tractor or aerial spraying, but in the great majority of present holdings where tiny plots of different crops are scattered all ove the place, a great task lies ahead of shifting the responsibility on to the farmers' own shoulders and at the same time making it far more economical. It may well be, that after suitable education, it may be desirable in the interests of the nation and of good farming to lay down that plant protection is a compulsory duty, particularly at times of severe outbreal All these circumstances suggest that in any future policy teaching

farmers to scotch a pest in its early stages will be an important objective, and they put a premium on a good extension and supply staff, already in touch with the farmer for the other "five firsts", who are quick observers and quick suppliers of counter-measures. The present plant protection services tend to be run separately from the extension service and so forfeit the advantages which such integration should provide. The problem once again highlights the importance of a well-organised, well-managed supply and extension service covering all interacting aspects of farming and a review of existing arrangements (which we undertake in the following chapter) with that objective in mind.

Better Cultivation Techniques

Scope & Function

50. Better cultivation techniques as one of the "five firsts" is used here in a rather restricted sense. It embraces that field of operation which can immediately be adopted by the farmer along with the other four instruments of improved production discussed in this chapter. It is, therefore, not to be taken as synonymous with those better farming methods which connote a change in the farming pattern involving the introduction of mixed farming, improved crop rotation, or better farm layout. Improved farming patterns as one of the techniques demanding alteration in present patterns of land use, due to its obvious long term nature, form the subject matter of subsequent discussion in this chapter. For the same reason, mechanisation, though it has an important part to play in better cultivation of land, has been excluded from the present discussion.

51. The better cultivation techniques in its limited sense thus include the preparation of the seed bed, inter-cultural operations and weed control through the use of hand tools and bullock-drawn implements. Land is cultivated to bring the soil to a state of tilth which will ensure unimpeded growth of plant roots and proper circulation of air and water throughout the root zone which is essential for absorption of plant nutrients and the promotion of certain physiological processes. Cultivation of land also

destroys the weeds which would otherwise compete with crops, reducing their yields. Bringing the soil to a satisfactory physical condition also increases the capacity of the soil to conserve moisture and is thus essential for economising in water use under dry farming or unirrigated conditions. After the crop has established itself inter-cultural operations are equally important to keep down weed growth and to remove obstacles to free circulation of air and moisture within the soil. Seeds and fertilizers can play their part in yielding a crop only when the physical environment is brought to such a state as will permit maximum interplay of physical, chemical and physico-chemical processes essential to the support of plant and micro-organic life. Proper preparatory cultivation of the land is thus a vital factor of crop production and improved tillage assumes increased importance if new varieties of crops, improved soil fertility treatments, and soil and water management are to produce their maximum effect on yield.

52. Timely ploughing and sowing is recognised everywhere as conducive to a good yield. Late sowing reduces the yield of all crops without exception. Every farmer is fully aware of the benefit of timely operations for the preparation of the land or for inter-culture. He often is unable to carry these out in time as he is inadequately equipped either with implements, labour or power. In Pakistan power for agricultural operation is either manual or derived from the bullock and success in cultivation depends on the plough, the way it is used and the power with which it is pulled. The bullock power varies much with size of the animal. Bullocks are small in size in East Pakistan and in mountainous parts of West Pakistan, and being weak they cannot adequately till the soil, make it fine and keep the land free of weeds. To achieve the desired ends, the improvement of bullocks by breeding and feeding is of course a necessity but implements used should also be of such types as will do the job rightly and are adapted to the bullock power available.

53 The proper placement of seeds or plants in a well prepared seed

bed is important for good germination and growth of crop plants. Work already done on crops like cotton and jute has shown that greater yields can be obtained by line sowing than by traditional methods. Though the benefit of line sowing is fully known to the research workers, it has not yet been possible to supply farmers with seed drills for this purpose. Proper spacing has the advantage of ensuring an even cover of the land and also facilitates subsequent inter-cultural operations by hand or bullock drawn implements. One of the elements of improvement in the Japanese methods of rice cultivation is the spacing of the plants at regular distances and it has been found that by proper spacing together with subsequent weeding by means of rotary hoes, increase in yield goes up by about 10%. Line sowing can also be introduced with much advantage in wheat, jute and broadcast paddy if the right implements could be supplied to the farmer in sufficient numbers.

54. A Pakistani farmer traditionally ploughs his land 5-8 times depending upon the crops that are to be grown and the nature of the soil. If improved furrow-turning ploughs were available both time and labour could be saved and efficiency of seed bed preparation increased. It is therefore necessary that improved bullock-drawn furrow-turning ploughs which are within the means of the cultivator and within bullocks power available should be devised. Clean cultivation has been recognised to be an effective means of increasing yields and so weed control is an essential part of cultural operations. The cultivator often does not practise effective weed control for the simple reason that it has to be carried out by hand and is both time consuming and costly. Weeds can be controlled in different ways such as cultural, mechanical and chemical. Under cultural practices factors such as deep preparatory tillage, fine seed bed and the sowing of crops in lines to facilitate other operations are helpful. In areas where weed growth is of the high grass and bushy types mechanical means of uprooting them have to be adopted. Where operation costs are high and cultural and mechanical methods are not applicable herbicides can be used with advantage on certain crops.

Present Position

55. Though the Departments of Agriculture have designed a number of bullock drawn ploughs and other implements such as seed drills and rotary hoes, the mass of cultivators still uses primitive wooden ploughs or wooden frames fitted with weak and thin iron plates. The Commission in their visits to the departmental workshops saw an impressive array of improved implements designed for preparing the soil under various soil and crop conditions. In the Tehsil and Thana levels also some of these implements have been kept in stores mainly for exhibition. What was striking, however, was that none of these implements has found wide adoption with farmers and no arrangement exists for their supply when and where there is a demand. There are many reasons for this. Often the ploughs designed are too costly and are not suitable for all the kinds of operations that the farmer is required to perform. He can hardly afford to buy a number of costly implements. No all-purpose plough has so far been designed to the farmer's satisfaction. Pakistan (A) and Pakistan (B) ploughs designed at Lyallpur approximate to some of these requirements as they have adjustments for changing the plough shares for different operations. But their acceptance by farmers is limited because of their high cost which comes to about Rs. 50/- a piece. In East Pakistan one or two ploughs, e.g. Kishan plough, have been designed by the Agriculture Department which give good performance in the field but they are too heavy for the small sized bullocks to draw and are also too costly for the farmer. Lack of handy repair and servicing facilities also makes the farmer less inclined to change to new implements. The use of new implements often requires a new skill which the farmer must be made to acquire through training and demonstration. Village blacksmiths on whom the farmer has to depend have not the knowledge and the material to handle repairs competently. It is not that the farmer or the village artisan has not the capacity or the intelligence to handle these simple machines; with a little training and experience he can make a good job of them, but

even then left to himself he will not perhaps vote for a change.

Design & Manufacture

56. Government departments have as yet made no provision for either the manufacture or procurement of the implements such as is made in case of seeds and fertilizers. Though a few firms here and there have entered into the business of manufacturing improved agricultural implements, these are badly handicapped by lack of raw materials. Many of these manufacturers have very small establishments and use old and inferior material for fabrication. Because of their small requirements of material, import licences are not readily granted to them. In the agricultural workshops established in the country through ICA aid, work is mainly confined to the repair and servicing of tractors and other power driven machinery, though research into the improvement of indigenous agricultural implements is one of their acknowledged functions.

Organisation

57. This problem illustrates the extent to which the whole range of interacting factors has to be taken into account if progress in production is to be assured. In overcrowded areas where animals are underfed they will not be capable of drawing improved implements. They must first be better fed. This demands fodder crops and changes in the farming pattern. But these in turn are difficult to bring about where land is short and nearly all of its produce required for human consumption, unless yields are significantly increased. The importance and the interaction of the "five firsts" in facilitating this increase becomes readily apparent. The problem also illustrates how much success depends, even in a simple matter like improving cultivation techniques, on simultaneous attention to all the details involved. The best implements have first to be determined, designed and standardised. For this intensive research, survey and trials must be carried out by engineers in collaboration with agronomists. Raw materials such as steel must be acquired and allocated to manufacturers. In some cases the implements may have to be imported. Then, apart from

the process of teaching farmers how to use them, some sort of mutual arrangement for their purchase, storage and repair will be desirable in many places for they will be expensive, only occasionally wanted and liable to deteriorate, circumstances which will continue to deter poor farmers from buying them. The managerial and organisational factor in the achievement of results comes once again to the forefront.

Short & Medium Term Credit

58. Even if better seeds, fertilizers, plant protection materials and improved cultivation implements are generally available it is unlikely that farmers will readily use them if they have to pay cash down for them first. In the preceding chapters we have emphasised the high incidence of low incomes in the agrarian sector as one of the country's chief problems. The majority of farmers in Pakistan are small holders of very limited means and the lack of any capital is a very strong reason for a general reluctance to embark on new practices and for a preference for inertia and conservatism. Issue of these aids on credit is likely to be an indispensable pre-requisite to breaking through this barrier and for that reason, credit is included by us in the "five firsts".

59. Of course capital is needed on a vast scale for many other agricultural purposes, for mechanisation, for improvements in irrigation and drainage systems, for tube wells and for other improvements in farm layout, but this implies long term credit and belongs to the later subject of changes in farming patterns. We are concerned here primarily with the application of the "five firsts" and that implies short and medium term credit. We discuss the problem of credit at some length in Chapter 6, but at the risk of some repetition certain aspects of it must be appreciated here.

60. Although there are some large farmers and, of course, some large landowners who can readily obtain credit from government sponsored agricultural credit institutions against the security of their land, for the very great majority, the pledging of land is not only an extremely cumbersome process but is usually undesirable and often impossible. Finding

alternative security to land is the central difficulty of the credit problem. Fear of failure to repay in the absence of such security is well justified. Cash loans made by cooperatives have a very poor repayment record, as have cash loans made through the revenue service of the government which have come to be regarded by the public more as handouts for disaster than as debts. Moreover the very low incomes of farmers furnish a constant temptation to divert any cash loan from production to consumption.

These circumstances lead to two deductions. In the first place loans are much better given in kind than in cash. In the second place the best, and indeed the only, security for the majority of farmers for these loans is the better crops they are intended to produce. It follows from this that the objective has to be to provide farmers credit in kind with better seeds, fertilizer, plant protection materials and better implements (and occasionally bullocks to use them) and to recover the outlay from the subsequent harvest. But the process involves a consequent absolute necessity for close supervision of the farming operations and an adequate organisation for competent book-keeping and for recovery of the loans from the individual farmers. We particularly draw attention to this cardinal point about credit because in the urge for results, there is a temptation to believe that the mere issue of larger sums of money to farmers will automatically increase production. Where such loans have been made against land security they may be helping production but they only touch the richer fringe of farmers. Where they have been made without security and in the absence of a proper system of farm supervision, they may merely lead to unproductive debt.

Sum of the Five Firsts

61. In our opinion the introduction of the "five firsts" is the quickest way to start increasing agricultural production. In many places they can be applied to great advantage without any alteration in present farming patterns. Later, when farming patterns are improved, they will still continue to form the greatest congerie of benefits which can be brought

to bear. Naturally their full potential will not be realised where circumstances hamper their use. Where land tenure customs are unsatisfactory, farmers will not use them because it does not pay them to do so. The same limitation will apply where floods or salinity are prevalent or where rains or irrigation water are short. But where these drawbacks are absent, or are put right, experience from both richly developed countries like U.S.A. and from recently developed countries like Japan, Mexico, Egypt and the Philippines, overwhelmingly supports the value of these first aids. Indications already available in Pakistan also hold out great promise for the future.

B- Techniques Demanding Alterations in Present Patterns of Land Use

62. Servicing the farmer with the "five firsts" under present land use patterns makes a favourable beginning and could make an immediate impact on the country's production over a wide front. But it only touches part of the problem and has to be supplemented by more radical action. Present land use patterns have serious deficiencies, such as fragmentation, which impede the application of important techniques such as irrigation and mechanisation and so offer no adequate long term base for satisfactory farming. They are also dominated by cereal production for mere subsistence.

63. This section of the report is therefore concerned with changes needed to bring about a permanent improvement in agricultural production. As usual the subjects which often overlap in reality have to be sub-divided here for clarity of analysis.

The first heading to be considered is consolidation. The second heading concerns improved farming patterns to introduce diversity of crops and better soil fertility. Under this heading the whole subject of animal husbandry, and particularly its relation to mixed farming, is studied. The third heading deals with mechanisation. The fourth heading deals with irrigation both in its aspect as a new technique for those regions which have not yet been irrigated and in its aspect in existing

irrigated areas where the problems of inadequate water use and salinity and waterlogging are paramount. In the fifth and last heading the advantages of a complete reorganisation of the farming system whereby the farmer can pool his experience and resources with his neighbours so as to obtain the optimum economic use of all modern techniques for the increase of production are discussed. The headings are thus as follows:-

Consolidation
Improved Farming Patterns
Mechanisation
Irrigation
Reorganisation of the Farming System.

Consolidation

Size of Holding

64. We have already laid emphasis in Chapter 4 on the present condition of the farmer, and on the fact that the average unit of farm operation both in East and West Pakistan is extremely small. According to the preliminary report of the Agricultural Census Commission (1959) the total number of cultivator holdings in East Pakistan amounts to around 6,200,000 distributed over a total cultivated area of around 19,000,000 acres giving an average of around 3 acres per cultivated holding. The figures for West Pakistan as a whole are not yet available but those previously collected for 22 districts in the former Punjab region show an average of around 3 acres per holding. In both wings the size of farms varies considerably both from farm to farm and from district to district. In East Pakistan the lowest average size is 1.6 acres in Tippera and the highest 5.2 acres in Kushtia whereas in the Punjab the lowest is 0.97 acres in Rawalpindi and the highest 8.7 acres in Multan. These figures do not give a complete picture, however, as many holdings are not cultivated wholly or at all by the owner. They may be let as a whole or in part to tenants who may or may not be landowners themselves. There is no doubt, however, of the small size of holdings and of cultivation units.

Subdivision & Fragmentation

65. We have also made it clear that, whether large or small, one of the fatal characteristics of the present holdings is the high degree of

subdivision and fragmentation to which they are subjected. In many cases, particularly in East Pakistan and in the barrani lands, there is no unified base of farm at all but merely a collection of scattered plots. There is a number of causes for this state of affairs and they are extremely difficult to rectify. It is partly the result of the Muslim laws of inheritance, partly of the exercise of an unrestricted right of partition and alienation, and partly of the varying productivity and physical situation of land in relation to flooding, homesteads, water points, and roads, Sentimental attachment and the lack of alternative occupations and emigration possibilities have further accentuated fragmentation and all these causes have made it extremely difficult to halt the process.

66. The small size of the holdings and all these complicating factors sometimes make it seem questionable as to whether it is worthwhile going to all the trouble of consolidation. It must, therefore, be emphatically stated that to let the present process continue is to condemn the country to a future of increasingly insufficient subsistence holdings, increasingly unmanageable for purposes of production and therefore liable to decreasing yields. In the present urgent need for production, consolidation and the prohibition of any subsequent uneconomic fragmentation, is a change which simply must be faced however great the difficulties involved.

Disadvantages

67. Members of the Commission walked round holdings in some areas to see what fragmentation implied for the farmer. In one instance there was one and a half miles of travel merely to go round the seven fragments which made up a two acre holding. Such conditions imply continuous uneconomic travel for all operations and a tremendous waste of man and bullock power. Merely to carry out the "five firsts" to get the land cultivated and weeded in time, to distribute fertilizer and farmyard manure and plant protection materials involves a great deal of unnecessary work, while to improve the rotational system and protect a fodder crop in some isolated plot surrounded by those of other people is excessively

difficult. In addition to these difficulties of management, access to and from the holding and the protection boundaries gives rise to constant argument and litigation. The delays in working round such an inefficient unit frequently lead to land being sown too late and to a proportion being left uncultivated altogether. The thousands of petty little boundaries also involve a considerable wastage of cultivable land.

68. These problems are of even greater significance when modern techniques of efficient irrigation and mechanisation come up for consideration. Hundreds of long tortuous and badly aligned water courses involve gross waste of water and inefficient distribution. Basically important levelling and drainage is difficult to carry out and the leading of water continuously through other people's plots, which may be planted with different crops, to reach some distant point, opens the door to constant dispute. In the case of mechanisation, uneconomic travelling time can make all the difference between profit and loss, while problems of access and the absence of roads form a chronic deterrent to the introduction of tractors, trailers and all the accoutrements of modern farming.

Advantages of Consolidation

69. It is true that in the case of a tiny holding the possibility of using machinery has to be considered against the alternative of much more intensified hand labour. It is also true that where there are big differences in potential and risk between high and low land, it may be desirable in the process of consolidation to split the units into two blocks so that each farmer has a fair share of the risk, but even this is a considerable improvement on the existing fragmented patterns, and if irrigation, drainage and fertilizer are introduced these risks can often be substantially reduced.

70. An additional virtue of consolidation arises from the subsidiary effect it has upon the difficult problem of land tenure. Extensive fragmentation often increases the amount of land which becomes involved in the share cropping system. Owing to the difficulty of managing widely scattered fragments small holders find it more convenient to rent parcels of land

near to their homestead and to lease out parcels which are distant from it, so that quite a large number are owners in one place and tenants in another. Although this may even cut some of the burden of inequitable land tenure conditions, it means that larger areas than necessary fall under the system of share cropping, with its great disincentive to productive investment. By contrast consolidation encourages ownership and direct cultivation by the owner, objectives which the land reform legislation is particularly designed to attain.

71. The process of consolidation is, therefore, an indispensable pre-requisite for a future satisfactory base for agriculture throughout the country. This has long been recognised in West Pakistan, and eminent authorities with long experience of the country, have gone so far as to say that it is the greatest single measure needed for progress. Considerable consolidation has been carried out there either under direct instruction by the Revenue Department or by persuasion by the Cooperative Department. In villages where it has been done there is evidence that the people have been very glad of the change once it has been accomplished.

Procedures

72. Nevertheless dependence upon the willing cooperation and intiative of the people themselves has proved too slow a process in face of the urgent need to stop the rot of fragmentation. In West Pakistan the Land Reform Commission has recommended working towards at least a minimum size subsistence holding, and preferably a minimum size economic holding, and the prohibition of subsequent fragmentation, and the West Pakistan Government has recently issued instructions to expedite the proces of consolidation everywhere. In East Pakistan about ten years ago provision for consolidation was made in the East Bengal State Acquisition & Tenancy Act. It was provided that if two-thirds of the people in a village holding three-fourths of the land applied jointly for consolidation the process should be put through by the revenue authorities. Left thus to the initiative of the people very little consolidation has yet been achieved

there, and it is apparent that government action on the lines of West Pakistan will be inevitable. Farmers in East Pakistan have not seen the benefits of consolidation demonstrated and a great deal of extension education will be needed, but the Commission was impressed not merely by the urgency of the problem there but by the high degree of awareness of this, and indeed the demand for consolidation in various districts. A compelling opportunity for its introduction which has not yet been utilised occurs now with the introduction for the first time in East Pakistan of many irrigation projects, starting with the Ganges Kobadak Scheme. If this opportunity is missed these projects will start on a faulty foundation which will be very difficult to rectify later, and which will permanently detract from their national value.

73. Consolidation in West Pakistan has hitherto been primarily concerned with ensuring a fair redistribution of land. This is of course of vital importance and the procedure even for the smallest cultivator must be executed with justice, without undue hardship to any and certainly without dominance by the larger landowner. Many countries have found it convenient in the case of the smallest holders to site their land where they can make the most of their holdings as intensive gardens adjacent to the local market. The problem of adequate representation in the determination of the process might be solved by bringing in the new Basic Democracy Councils.

Consolidation as Related to Future Land Usage

74. It is extremely important to appreciate that from the national point of view there are economic considerations which cannot be overlooked because of their effect on the future needs of production. At the time of consolidation the opportunity must be utilised to align individual boundaries with soil conservation contours and the efficient layout of irrigation channels. There must be allowance for access roads to holdings and for community buildings. Land withdrawn for these purposes must be proportionately deducted.

75. Whatever new laws are passed against fragmentation, the question will always arise as to how so many in the family are going to subsist, whether their share in the inheritance is to be settled in cash in lieu of a fragment of land, or whether they will still continue to participate in the income of the undivided holding. It cannot be too frequently pointed out that there is no answer to this problem except through the creation of additional jobs and additional economic activity. This in the case of Pakistan at the moment is largely dependent upon increasing the productivity of the land. All efforts should therefore be directed to that end.

76. It will be clear from the above discussion of consolidation that once again a very big task is implied. But once a good foundation is laid by consolidation the individual farmer's chances of applying the "five firsts" and benefiting from this and other techniques, are greatly improved. Psychologically and physically these changes and the extra work they involve become far more tolerable and far more effective when applied in one compact holding.

Improved Farming Patterns

The Importance of Mixed Farming & Crop Diversification

77. Mixed farming involves the integration of crops with livestock so that the yield from both is enhanced in a harmonious system of land exploitation. This concept is far from being widely understood in its fullest implications in Pakistan today, although a limited form of mixed farming involving fodder production for draught animals already is in operation. It can only be assumed that present policies and farming patterns in general have evolved from the tradition that a considerable degree of separateness exists between the two forms of production. In large measure, this attitude of mind has perhaps been unavoidable in the past, because the issues involved were not fully appreciated and the issue has been, and still is, clouded by the problems posed in finding food for a rapidly expanding human population and the need to grow crops which can be exported to provide foreign exchange.

78. The reaction of governments faced with the first of these problems is to encourage the form of production which will give the highest yield of human food. This usually means the encouragement of crops for direct human consumption, particularly of cereals such as wheat and rice. Crops when consumed by livestock are converted into high grade foods such as beef, mutton, milk and eggs but the total food values produced per acre are much smaller than by direct cereal or potato production. However, it must be remembered that much of the food consumed by livestock, such as straw and other crop residues, grass and browsing plants, is unsuitable for human consumption, and also that by growing a few acres of arable fodders as a reserve for times of scarcity, it is possible to harvest production from many hundreds of acres of grazing land which otherwise might be unexploitable.

79. There are also the very great benefits to be derived from the increased fertility brought by better crop rotations and intensive livestock use.

80. That the value of rotations is appreciated in Pakistan is illustrated by the widespread use of berseem, both as an animal feed and as a soil improver. Many farmers in the country have expressed their opinion that berseem is valuable in improving the yields of following crops and this is confirmed by trials at Lyallpur.

81. Green manuring has not been accepted as a general practice in Pakistan and campaigns designed to encourage its adoption have met with a large measure of failure. It is suggested that using green manuring as practised to increase the fertility of the soil is not the best approach. The small farmer sees that he is turning into the soil a crop which is needed by his draught animals and decides that it would be better to use it as feed. Moreover tall growth cannot be easily ploughed in by the primitive equipment at present used by the farmer.

82. A different approach may be possible. During the last fifty years in the United Kingdom there has been tremendous development of the system of crop and livestock integration known as Ley Farming and this has

spread to many parts of the world. The essential features in its successful development are that pastures composed of grasses and legumes are established and left for a few years; the green growth is grazed by livestock and the dung and urine are returned to the soil. When the area is later ploughed, the succeeding crops benefit from the accumulated fertility.

Livestock in the Farming Pattern

83. Obviously a balance has to be struck between the various requirements of human food, cash crops and animal food, but the future approach must be towards more balanced farming systems, which will give sustained higher production from the land while meeting all the national needs Apart from the importance of livestock in balanced land use, is the need for livestock as draught animals and a position has now been reached in some areas where the working animal must be denied adequate food so that human-beings should not starve or so that cash crop production may increase. At present the livestock in many places, particularly in East Pakistan, are maintained in very poor condition, grazing on road verges and plot boundaries and on stubbles and crop residues. Concentrated foods, such as mustard oil cake, are only rarely fed to them, being used either as organic manure or exported.

84. The situation deteriorates as holdings become smaller and increasingly fragmented, yet nearly every cultivator tries to maintain his own pair of bullocks. This is not a reflection of a love of animals, an expression of wealth or a need for floating capital. To the farmer it is a necessity, for unless he is able to cultivate his land, when it is just right for cultivation, he may get a reduced crop or no crop at all. He will do his utmost, therefore, to have his own animals available at the crucial time. However, there is an increasing development of bullock hiring by the smaller farmers in East Pakistan which should be encouraged. It is obviously uneconomic for all the very smallest farmers who own perhaps less than one acre of land to keep their own animals. Changed conditions since Independence have had an adverse effect upon the livestock industry

in East Pakistan. Previously, mature draught stock were brought in from Assam and Bihar, worked for a season or two and then sold for slaughter. With this source of supply lost, animals must now be raised locally and the additional fodder needed for the maintenance of the young stock must come from the already overstrained resources.

85. The situation is not so bad in West wing of the country, because there the population pressure is not as intense and there is a long tradition of animal rearing which has produced some world famous breeds of cattle. In addition, the vast areas of natural grazing land which largely encompass the intensively farmed areas have a profound effect on the whole pattern of livestock rearing. However, even here there is no call for complacency; although good animals exist, the majority are ill-fed and the livestock industry contributes far less than it should to the national income. Despite the fact that as much as 20 per cent of the land may be devoted to fodder in the villages in areas such as Montgomery, this is used mainly for the draught animals and comparatively little goes to feed milk cows or buffaloes or an improved beef animal.

Changing the Farming Pattern

86. The consumption of meat and milk in Pakistan is very low compared to more developed countries. In order to raise the country's nutritional standard it is obvious that the first priority is to accept that the production of "hunger avoiding" cereals must be raised to meet food deficits and thus provide the time required for other changes to be gradually brought about. This initial burst of production can be achieved by increasing either the yield per unit area of land or the area sown. The potential for production of such crops must be raised to a point where it will be feasible to devote a higher proportion of the land to crops for livestock feeding. Research into the best types of fodder to be grown is urgently required as a first step and, having found better fodders, it will be necessary to find the best ways of using them. It may be very well worthwhile to make silage and hay and farmers will have to be taught the best methods of doing so, with

particular emphasis on the value of cutting at an early stage of maturity. The best ways of incorporating fodder crops and pastures in rotations must be investigated so that fertility can be enhanced and additional foods for animals raised.

87. If the necessary developments are to be brought about it must be realised that mixed farming requires the combined attention of three men - the livestock man, the agronomist and the veterinarian. At present the first does not exist and the others show little interest in animal husbandry.

Crop Diversification

88. The prominence given to the development of mixed farming and cash crop production must not be allowed entirely to overshadow the importance of crop diversification on both the national scale and that of the individual farmer. What is needed in the future is a reduction of the emphasis on cereal growing. In the foregoing section, it has been made clear that real mixed farming will not become general for some years to come. In any case, livestock feeds are not the answer to all the problems of human nutrition in Pakistan and there will be a definite need for more fruit, vegetables and pulse crops. Not only can pulses take the place of animal protein during the period of temporary deficiency, but they will always be a valuable item of diet.

89. To increase production of all these different foods the room for manoeuvre created by the adoption of the "five firsts" will be essential. For the successful growing of fruit, production and efficiency in plant nurseries must both be enhanced. Increased vegetable production will depend upon the availability of seed of good varieties and the improvement of marketing including a margin for quality production.

90. Increased yield of pulse legumes will depend perhaps upon finding new species such as soya-beans or expanding the production of species now grown only to a small extent such as broad-beans, field peas and groundnuts or upon the improvement of varieties (or making available seed of improved varieties) of such as gram, lentils and mung. Since

these pulse crops are phosphate hungry, the supply of phosphatic fertilizers will be essential for best results, and its absence in the past may well explain the relative failure to cultivate these crops

Animal Husbandry in Improved Farming Patterns

91. The place of livestock in a new approach to mixed farming has been discussed. The contribution of livestock to the better nutrition of the people and in the part they play in soil fertility was stressed. The need for a vigorous livestock policy is proved by the high cost of milk and eggs and the fact that there are two meatless days in the week. Improving livestock depends on breeding better animals, feeding and managing them better and keeping them free from disease. Improving quality through breeding is a slow process and can take many years before it shows results, but better feeding, provided the animals have the potential to respond can have immediate effect. Better management involves the education of the farmer, but better disease control largely depends on improving the efficiency of the departments concerned.

92. The development of the industry over the past decade has been handicapped by an unsatisfactory administrative organisation and some controversy regarding policy. Too often arguments are based on opinions and not hard facts, and the lack of adequate information makes advising on future policy extremely difficult. The first consideration must be that of collecting reliable information so that a clear policy can emerge and this means properly organised research.

The Importance of Feeding

93. One aspect of feeding which was not raised earlier is the need to encourage the manufacture of concentrated animal feeds. Many products which might be utilised are being wasted or not used in the best way. Every effort should be made to use such common by-products as fish meal, offal, cotton seed and mustard cakes, molasses, and sugar beet pulp in animal feeds. The export of high protein feeds such as cotton seed cakes should be reviewed and adequate cereals must be allowed to balance feeding stuffs

where required. With the opening of the urea factories the possibility of using this substance to improve the quality of feeds should also be investigated.

Breeds of Livestock

94. With the wide variations of climate and farming systems in the country it is essential that a policy of relating a species of breed to a particular environment should be considered. Considerable differences of opinion exist as to whether cattle or buffalo should be maintained to provide milk, draught power and to a lesser extent beef in the irrigated areas. At present both are found indiscriminately mixed and there is a tendency to use cattle for draught and buffalo for milk. From a national point of view this has disadvantages in that maintenance herds are required for both. There could be considerable saving in numbers and therefore economic advantages if only one species were maintained. The farming community in general would appear to favour buffalo as shown by the steady increase in numbers both absolute and relative to cattle in recent years. This development is viewed with apprehension by some and it may be advisable to list the arguments for and against the encouragement of the buffalo. They have been listed as follows:-

Arguments against buffalo

1. Buffalo male is not a popular draught animal, because it is slow (2.5 miles per hour compared with 3 for a bullock).

2. The buffalo cow is slow maturing and has longer intervals between calvings, so that herd numbers must be higher for a given number of lactations.

3. Buffalo is less heat-tolerant (because it lacks an efficient perspiration mechanism) and unsuited to dry areas unless wallows are available or they can be frequently hosed down. It is in any case unable to work satisfactorily in the summer day temperatures.

4. Buffalo meat is coarse grained, contains more water, lacks interfibrial fat and is less palatable than beef.

5. They cannot forage and are therefore unable to utilise extensive tracts with poor grazing.

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* Wahid Abdul, report to the Commission.

Arguments for buffalo

1. Buffalo females produce more milk (3-5000 lb. per lactation of 300 days is obtained on average from animals kept under good conditions compared with 2500-3500 from average cows in the same period) and it is of higher quality (7-8 per cent butter fat as compared with 4-5 per cent for cows).

2. While buffalo males are slower they are more powerful and what is lost in speed can be made up by increasing the load. They are better suited to paddy cultivation and waterlogged areas.

3. Buffalo is able to cope with more roughage than cattle.

4. Buffalo has greater longevity and a longer profitable life than cattle (upto 25 per cent more).

95. In East Pakistan there is an aversion to buffalo and preference is given at present to cow cattle. But with the anticipated expansion of irrigation in the East wing and the predominance of paddy cultivation, serious consideration may have to be given to increasing the numbers of buffalo.

Sheep & Goats

96. These two species have been considered in relation to range use so that little need be said here. They should not however be relegated entirely to range areas and there may be a case for their use in irrigated lands particularly sheep for fat lamb production and goats for milk. In East Pakistan the goat plays a significant part in village economy and it should be fostered as it has many advantages including resistance to disease, suitable size in relation to small holdings and it gives milk, meat and hides, the last of which is a valuable export commodity.

Breeds of Cattle

97. There are six main and distinct breeds of cattle in West Pakistan. The Sahiwal and Red Sindhi, the milking breeds; the Thari, a dual purpose (draught and milk) animal; and the Bhagnari, Dhanni and Lohani which are draught breeds each with special characteristics suited to different parts of the country. In East Pakistan there is no pure breed although distinct types, a grey in the west and a red in the east, are recognised.

98. In view of their regional value and adaptability it is likely that all six breeds should be retained, but in view of the desired increase in milk production and the probably gradual future reduction in the use of the

draught animal, more attention should be given to the milk production potential of each. If it is accepted that milk production is one of the main needs of the country and that the use of animals for draught will decline, then the character to be sought in the future cattle breeds of the country in descending order of importance would be: milk potential; draught ability; meat quality; conformation, constitution and longevity. Characteristics such as horn shape, colour and markings which have no economic value should be given little consideration.

99. This does not imply that all the breeds of the country can be made real milking animals, but the Lohani, Bhagnari and Dhanni breeds have not been bred or selected for milk and this policy could be changed. There is no reason to suppose that the two needs are incompatible and some additional income from the cows would increase the profitability of these breeds.

Importation of Foreign Breeds

100. An important question is whether it is advisable to bring in foreign breeds for crossing with local stock. A number of breeds has already been introduced and a considerable number of cross-breeds raised on the Military Dairy Farms. However, it is felt that this matter shoul be approached with some caution. The subject raises much controversy among cattle breeders. One side argues that Pakistan has some really outstanding breeds of cattle which must be kept pure, while the other claims that crossing can bring about more rapid improvement.

101. Reasons given for retaining pure local breeds include their adaptability to local conditions following many centuries of natural selection; the excellent qualities for heat tolerance and disease resistance; the potential overseas market for local breeds and particularly Sahiwal and the Red Sindhi; the unsuitability of foreign breeds, which are inevitably European breeds as far as milk production is concerned, for local conditions and the danger of releasing even cross-bred animals in villages where management and feeding are poor. Counter reasons given include

the following: although the local milk producing breeds can give up to 6,000 lb. of milk or more only a few animals are capable of this level of performance and dependence on local animals alone will delay improvement; while it is appreciated that too much foreign blood might bring about deterioration in constitution, crossing with imported breeds could rapidly raise milk production; there are possibilities for evolving a new and better strain from crossing imported animals with local breeds.

102. Both points of view require consideration and a decision can be given only when the relevant research work has been carried out. Such research work could be given a flying start if the excellent records maintained by the Military Dairy Farms were analysed by a competent livestock genetecist.

103. The strictest control should be maintained over cross-breeding and crosses with foreign blood should not be allowed to spread to villages. A case might be made for the importation of Santa Getrudis animals for testing under local conditions crossing with Bhagnari to produce a more rapidly maturing type of beef animal. In the meantime, the fullest attention must be given to the improvement of local breeds and the distribution of quality bulls to the villages.

104. The above comments apply primarily to West Pakistan as in the East wing conditions, as already stated, are different. With the present feed situation it is scarcely possible to embark on a policy of livestock improvement, but the situation must change and the same controversy arises. Should efforts be made to raise the quality of the local animal or should breeds be imported? Fortunately the breeds of West Pakistan, particularly the Red Sindhi have great possibilities in the East. This is not to say that the local animals should be neglected however and there is room for concurrent improvement through local selection and perhaps crossing.

Buffalo

105. The improvement of buffalo seems to offer little complication. There are two recognised breeds, the Ravi and Nili, both availabl-

large numbers and these provide a broad basis for future breeding and selection.

The Organisation of Livestock Improvement

106. Government's responsibility to raise the quality of livestock by provision of improved male animals has been recognised, and has resulted in the establishment of government breeding farms. These farms, however, could be better managed. Their budget and staffing do not appear adequate to make the best use of the stock and land made available.

107. The approach to multiplication of livestock has a parallel in seed production in that there should be three strata of production. These three strata could be (i) the government stud farms and military dairy farms, (ii) registered breeders, (iii) village distribution.

Artificial Insemination

108. As regards artificial insemination, there are two schools of thought. The first condemns the use of any bull for artificial insemination unless he is a proven sire. The second which is the policy adopted by the Pakistan Artificial Insemination Committee, is less strict. The Committee has adopted an approach comparable with most other countries in this field which have inadequate numbers of proven bulls for their artificial insemination programmes. The PAIC policy is as follows:-(a) Artificial insemination should be introduced wherever practicable irrespective of whether the sires used are proven or not, because selected sires now being used in artificial insemination are definitely superior to those used at the village level; (b) Until such time as proven bulls become available bulls for artificial insemination should be selected by pedigree, type and conformation and no one individual bull should be used very extensively in any given area; (c) The existing farms which have a herd strength adequate to carry out proven bull experiments should immediately start testing their bulls so that proven bulls become available in reasonable number in the shortest possible time; (d) All bulls at the existing government farms having at least five milk recorded daughters and who can be classed as

showing superior transmitting abilities should be used in preference to others for which such records are not available; (e) All the inseminated cows and their progeny should be marked with ear tags for purposes of identification; (f) As an artificial insemination programme is being developed, it is of vital importance that the necessity of balanced feeding of improved livestock should be made known to breeders who should take optimum advantage of genetical improvement made by artificial insemination.

109. This approach to artificial insemination has been in operation for some time and it is generally accepted as a practical way of bringing reasonably rapid improvement in the quality of livestock. However, it must be pointed out that the organisation needs considerably improved facilities, transport and equipment, if the desired results are to be achieved. The East Pakistan organisation is particularly in need of improvement.

110. Scrub bulls should be eliminated but this obviously can only be attempted when satisfactory arrangements are made for the supply of improved sires.

Sheep & Goats

111. At the moment research on sheep is being directed towards developing fineness in wool and for this purpose breeds such as Rambouillet and Corridale have been imported. This policy will probably have limited application because there will be few areas where exogenous sheep or crosses can be maintained. We consider that such work together with breeding and selection amongst local breeds both for fine wool and carpet wool should be a subject for expert advice from overseas.

112. Another aspect of sheep improvement which has been given scant attention in the past is improvement for meat production. It is conceivable that range lambs could be fattened on irrigated pastures as a profitable venture. This would require selection and possibly a cross breeding programme. A programme of research could also be planned following specialist advice.

113. With goats, the major research development could be the improvement of indigenous goats and cross breeding with the primary purpose of producing heavy milking breeds.

Animal Health

114. Livestock diseases are serious limiting factors in livestock production. They cause enormous loss of life each year, and also seriously impair the productive ability of livestock.

115. The total livestock population of Pakistan according to the livestock census 1945 was 76 millions, including fowls and ducks. Authentic data on the livestock mortality are not available but general observations indicate that overall annual mortality varies from 10 to 20 per cent. in animals while in poultry it varies from 20 to 30 per cent. This loss, together with the depreciation in the value of those which survive attacks of disease is difficult to assess, but it must be very great indeed.

116. Prevention, control and eradication of livestock disease is the responsibility of the provincial governments. Each has an Animal Husbandry Department to do this work, some veterinary hospitals have been established and most of them are under the charge of qualified veterinarians whose responsibility it is to carry out preventive inoculation against infectious diseases and to control epidemics as and when they occur, by vaccination and suitable hygienic measures. In addition, some mobile veterinary units carry out mass vaccination of animals against common diseases such as Rinderpest. There is also a team of Diseases Investigation Officers in each province to assist the field staff in the diagnosis and control of infectious and parasitic diseases. Biological products are manufactured by the Animal Husbandry Departments and by the Central Animal Husbandry Research Institute.

Problems in Disease Control

117. Under the present organisation 'Patwaris' are required to inform the nearest Veterinary Assistant Surgeon of any outbreaks of contagious disease among livestock. In practice this system is not very efficient and

frequently diseases take heavy toll of valuable livestock and spread over wide areas before notification is received. Villages located near highways and other main routes can be reached easily during outbreaks, but inaccessible villages which are by far the most numerous are difficult to get at and this seriously hampers control measures.

118. As stated, biologicals are manufactured by both provincial and Central Governments but are neither standardised nor tested by an independent organisation. The production of more efficient biologicals against a number of diseases requires early attention. At present there is no system of marking vaccinated animals treated against diseases such as Rinderpest, for the purposes of identification, with the result that: (a) the extent of success achieved with Goat Tissue Virus Vaccine cannot be accurately measured; (b) vaccinated animals are likely to be revaccinated when there is recurrence of outbreak in the same village causing waste of money and labour; (c) vaccination work cannot be checked effectively, and (d) non-vaccination animals cannot be traced for vaccination.

119. There is no effective control of the international or inter-district movement of animals and many disease outbreaks are traceable to the introduction of animals from outside areas or from cattle fairs. The long borders of Pakistan with Afghanistan and India have innumerable points of entry, which make it extremely difficult to exercise strict control on the movement of animals. The unrestricted movement of Afghan Powindas may lead to the spread of infections and parasitic diseases. Although legislation exists for carrying out compulsory vaccination of animals against contagious diseases, this can be done only when outbreaks occur. No provision exists in the present legislation for compulsory vaccination of animals on a prophylactic basis.

Improved Farming Patterns in Barrani Lands of West Pakistan

120. The barrani areas of West Pakistan were described in Chapter While many of the problems in these areas have much in common with the rest of the country, they have their own difficulties, and the contribution

of these lands to the country's economy - they provide roughly 40 per cent of the wheat-warrants specific discussion.

121. The most acute problem is soil erosion, which is leading to a very rapid decline in natural resources. Unfortunately, the ever increasing demand of the growing population encourages the adoption of practices which accelerate erosion. Such practices include the ploughing of unprotected slopes, the destruction of forest cover and the overgrazing of the range land. This demand for increased production still continues and it must be satisfied at the same time as erosion is controlled otherwise disaster will follow.

122. The unnecessary conflict between humans and livestock for the available land is nowhere more evident than in the barrani areas, and here too the solution must be to increase the food supplies of both by the adoption of better cultivation methods. Much of what was said about the complementary nature of crops and livestock production in irrigated areas applies here, but the possibilities of change may be even greater. Obviously, a first step must be the adoption of the "five firsts" followed or accompanied by the adoption of better forms of land use.

123. Demonstration areas have shown that the wheat crop can be doubled in yield by the use of improved varieties, balanced fertilizers, better land preparation, and improved soil conservation techniques, including levelling and bunding, to conserve both moisture and soil. In addition to raising the yield of staple foods there is the possibility of raising the rproduction of other crops. Diversification is necessary and feasible, pulse legumes such as broad-beans and peas could be grown in the winter, drought resistant tree crops could be planted to produce fruit and fodders and provide shade. Consideration should be given to testing drought tolerant Mediterranean varieties, such species as the carib tree.

124. New crops and new techniques create opportunities for extra production in the barrani areas, and particularly important will be the potentialities for more intensive cropping and less fallow. In chapter 4 the

typical rotation of the barrani areas was given. This indicates that one hundred per cent cropping is carried out whereas the possibilities exist in some areas of good rainfall for two hundred per cent, that is a crop in each season of rainfall on all land.

125. In the Mediterranean area which has rain in winter only and where a form of barrani cropping is practised, winter cereals alternate with fallow in a 50 per cent cropping intensity. The old argument for the fallow was that each crop required two seasons' rain, but modern research has shown that the major limiting factor was low fertility, and particularly the lack of nitrogen which was built up in the fallow year. With artificial fertilizers now available to enhance fertility, fallows can be largely eliminated.

126. The situation in the barrani areas of Pakistan is not altogether comparable but indications are that cropping intensity can be increased, because in fields near the homesteads to which farmyard manure is applied, 200 per cent cropping intensity is usual. Here admittedly the moisture retaining qualities of farmyard manure must be taken into account, and while application of dung over the whole of the arable land is obviously impossible, many of the benefits could be obtained from application of fertilizers and the use of improved rotations. If the concept of sown pastures of a mixture of grasses and legumes and of a few years duration in the rotation could be accepted, this would pave the way for a form of Ley Farming.

127. Ley Farming and fodder crop production can provide a balance in land use which is required in the barrani areas. Leys, either as part of the rotation or as a permanent form of cropping on sloping, erodable areas, would raise soil fertility, feed animals better, reduce the pressure on the other grazing lands and, combined with proper conservation measures, eliminate the disastrous loss of soil. Fodder crops could be fed green or made into hay and silage to be used in times of scarcity. Before these developments can be confidently recommended, however,

there is need for a considerable amount of research into the types of plants and crops to be grown and the rotations to be followed.

128. The approach will need to be varied over the area. In the eastern drier and hillier region for example, soils are thinner and the topography demands special techniques. The difference between the conservationist's approach, and the improvident, over-exploitation normally found, is demonstrated convincingly at Kalabagh where as a result of grazing management, the slopes are covered with grass and many more animals per acre are carried than on neighbouring unprotected areas. Erosion is also checked and fertility and productivity increased.

129. Conservation of both soil and water in these areas can be vastly improved by the building of check dams and small reservoirs in the nullahs. These check the flow of water, permit it to be diverted on to crop land, result in silting and therefore creation of fertile fields in the nullah bottoms and generally prevent loss of both soil and water and encourage the return of perennial flows. The techniques involved are part of the traditional skill of the people of the area and it needs only official help and guidance on more difficult projects, to bring about real development. First class work of this kind is also demonstrated at Kalabagh.

130. In the western part of the region, the techniques required are slightly different in that rainfall is heavier and soils are often much deeper. A major problem is to retain as much water on the land as possible while permitting the surplus to move away without causing damage. This has long been appreciated by the farmers, but, in their anxiety to crop as much land as possible, or often as a result of complicated ownership and use patterns, inadequate methods of soil and water conservation are used which may cause in the long run increased soil losses.

131. In these areas the possibilities of improvement are being demonstrated by the Soil Conservation Service. The selected areas have been carefully surveyed to determine the type of work required to meet the different needs. Soil conservation practices including broad-based

terraces, bund reinforcement and alignment and contour cultivation and planting have been demonstrated. Efforts have been made to introduce new crops, including legumes in rotation and to demonstrate the use of fertilizers.

132. While there is scope for increasing production by the use of better techniques, there are many problems associated with population pressure on the land and the consequent small size of holdings and their fragmentation. Another complication is the age-old custom whereby the fallow lands and stubbles are grazed by one and all after harvest. This makes it difficult for a farmer to protect his land even when it is in a compact block; when it is a scatter of plots, protection and control become impossible. As a result of uncontrolled grazing, field embankments and plantations are damaged and farmers are reluctant to waste their slender resources on improvements which can be so easily destroyed.

133. The problems of introducing measures for a catchment basin soil conservation scheme into an area covered with a patchwork of holdings are very great and progress will be almost impossible without full scale facilities, including adequate numbers of trained staff, and official understanding and support for the programme of the Soil Conservation Service.

134. Measures will have to be considered to reduce the population pressure on the land in terms of both human beings and livestock. The ideal pattern should see consolidation and a considerable increase in the size of holdings (possibly the introduction of cooperative types of farming) soil conservation planning on a catchment area basis and considerable increase in mechanisation. The last is essential if full cropping is to be introduced and if nutritional crops and productive, as distinct from draught, animals made available. The many problems to be met on a national scale with increased mechanisation are dealt with in the next section.

Mechanisation

Effect on Employment

135. The standard objection in Pakistan to the mechanisation of agriculture is the fear of widespread unemployment and it is a very valid one. Moreover it is important to use to the fullest extent the one resource the country has in abundance, namely human labour. Nevertheless there are strong reasons for examining the case for mechanisation. In judging its value there is need to assess whether its use may not earn or save far more foreign exchange than its importation costs, and by increasing production create far more jobs in the long run than it displaces. It is true that in Pakistan industrialisation has not reached a stage where population displaced from the land can easily find employment. When individuals are displaced real human problems are created, but these individual cases of hardship have to be compared with the prospect of poverty and unemployment faced by the whole country if agricultural production is not increased.

136. It is pertinent to point out here that there should be a considerable additional demand for rural labour to execute the many agricultural development projects needed and that the increased yields therefrom should in due course create new employment throughout the economy. Moreover in the present state of limited financial resources and shortage of technical knowledge the whole country cannot be mechanised in a short period. These two factors should mitigate the risks of widespread unemployment.

Advantages

137. As against these risks mechanisation could be of great value in a number of ways. At present agriculture everywhere in the country is dependent on the draught power of bullocks. We have already stressed the fact that over wide areas, particularly in East Pakistan, these bullocks are small and underfed and in the present competition between man and animal for land their condition represents a constant anxiety to the farmer. Their poor condition precludes the use of improved implements and this in turn necessitates ploughing the land a very large number of times to get

it into satisfactory condition. Often this is impossible to achieve and it involves delay so that frequently it is the determining factor as to whether an additional crop can be grown or not, or even whether the whole of an individual farmer's land can be planted. Yet each farmer tries to keep his own pair of bullocks just because it is risky to rely on a neighbour's pair. The result is a kind of vicious circle with too many bullocks too underfed to do a decent job. It is true that the introduction of the "five firsts" is intended to break this circle but one of the items therein is itself improved cultivation without which the other "firsts" may lose much of their merit. Dependence upon inadequate bullock power not only makes the preparatory cultivation unsatisfactory, but also allows weed growth so adding to the cost and drudgery of subsequent operations.

138. The introduction of machinery can be of critical value in helping to break this vicious circle. The machine can operate much more speedily and deeply. It can prepare the land far better with fewer operations and thereby ensure timely sowing and weeding which are both important factors in yields. It can ensure that all the land is sown to a crop and can enable an additional crop to be grown. It can also carry out far more rapidly and effectively the burying of crop residues and so reduce the incidence of pests and diseases and add to the soil humus.

139. These primary advantages of machine power become of even greater importance on the introduction of new farming patterns, particularly under irrigation, wherein a quicker turnover of more crops means increased claim on draught power and increased risk of carryover of pests and diseases. In East Pakistan especially, after the flood recedes the soil hardens quickly and becomes difficult to work. As a result, the land is generally left uncultivated till the advent of the next rains. When irrigation becomes available, it will be desirable to cultivate the land immediately after the monsoon crop is harvested so that the following crop will have sufficient time to mature. Again after this crop is harvested cultivation must be done very quickly so that the next crop can be sown

and established before the flood comes. It is almost impossible for these operations to be carried out in time with only the present bullocks as sources of power.

140. Machine power is also essential for certain other purposes. For a rapid reclamation of virgin land it is almost a necessity. Such land often needs levelling or is excessively hard or weedy, and dependence upon bullock power alone has led to much of it being left uncultivated or very inefficiently used.

141. Finally machine power by its very effectiveness can have a great value psychologically. One of its greatest benefits has been to reduce the general conservatism and inertia of rural areas because it can take away a great deal of the drudgery and uncertainty of farming. It can change the status of the workers in agriculture - as it has in the Western world - from the low level associated with unskilled drudgery to the higher level of respect accorded to the technician. The machine can provide far more effective transport from farm to market than the slow bullock cart. This will be of great advantage when yields go up and farming is diversified and raises more perishable goods for the non-agricultural population.

142. In a similar way machine power, by reducing a farmer's paramount anxiety about losing his bullocks by disease and theft may help to give him a much more forward-looking attitude. Replacing lost animals is extremely expensive and may reduce a man to penury or cause him to mortgage his small holding. To ensure against this he tends to keep an excessive number of animals as a reserve. Machine power would remove this anxiety and enable him to switch from the struggle to feed bullocks to the cultivation of more land for cash crops or to feed dairy animals. It would also simplify the ploughing up of pastures and the burying of green manure which is important in maintenance of fertility but difficult to carry out with weak bullocks and inefficient implements.

143. For all the above reasons it is clear that the introduction of machine power is very far from being a matter which can be dismissed

because it may cause displacement of labour and unemployment. It may, indeed, be a critical factor in helping farmers to break away from the present conditions and in bringing new hope to them, besides being one of the greater practical methods of increasing production. This view is strengthened by the fact that the natural features of the country are unusually well suited to the use of machinery.

Economics

144. Experiments and experience in the country have demonstrated most of the advantages outlined above and have also indicated that operating costs can under some conditions be lower than those of bullock and man power. An important factor to bear in mind is that the cost is largely dependent on obtaining the maximum use out of the machine on productive work. This is partly a question of employing the machine for those jobs which human and bullock power perform only ineffectively now. Concentration on this aspect will help to rationalise the problem of displacement. It is also partly a question of finding jobs which the machine can do throughout the year so that its high capital cost can be spread as widely as possible. Conditions of climate and communications may be determining factors in this respect but a most rewarding single factor will be the avoidance of idle travelling time.

Place in Reorganised Farming System

145. This emphasises the importance of consolidation as a prerequisite to effective usage, as obviously idle travelling may be excessive, when holdings are fragmented and dispersed over a wide area. Further, on small plots the machine has to turn every few yards. Even when consolidation has been effected a problem of idle travel arises in the case of community owned or hired machines when each individual farmer plants his different crops as he pleases and to no common design, especially when each man's total holding continues to be small and his individual plots tiny.

146. These considerations show that a vital condition of economic

mechanisation is the planning of crop layouts so that the machine can be used as much as possible on a uniform job over large blocks of land. This, no doubt, is one reason why such mechanisation as has been introduced has been mainly on large estates. Sometimes, particularly in West Pakistan, mechanisation has been effected by ending the tenancy system and replanning the field layout to provide the roads, the rectangulated irrigation channels and the solid blocks of crops which offer the best opportunity for efficient machine use. In the nation's need this pattern is an important approach to a progressive future and it is likely to be sought by larger landowners who, since their estates have been cut down by the land reforms, have begun to question the virtue of the tenancy system and to look for alternative ways of increasing their incomes.

147. A far greater question raised by the possibilities of mechanisation is how to bring its benefits to a community of tenants or owner occupiers on small holdings. Into this question many other considerations besides mechanisation enter and for that reason we discuss it later under the heading "Reorganisation of the Farming System". It should be noted here that mechanisation can make a critical difference to production but that its effective use is likely to be dependent on a much higher degree of planning in farm layout. This again emphasises the importance of the managerial and organisational element in the country's future agriculture.

Organisation

148. This need is more evident because of the problems of maintenance, of technical training of artisans and of research into the most suitable tractors and implements for different areas of the country. Lack of spare parts and of facilities for maintenance have been major deterrents to the introduction of machinery as has the lack of knowledge in the country of how to run and repair the machines. Individual commercial firms could rectify some of this for individual users on large estates if foreign exchange allocations were more generous, but the application of machinery to communities of small holders would necessitate a great network of workshops and stores, special training of local people as drivers and mechanics,

and, for economical usage, planned programmes whereby an appropriate number of machines could operate near each other under the supervision of a competent mechanic. Such a network could best be set up and operated in the early stages by a government organisation. Prior to the setting up of any such organisation, there would have to be determination, by testing, of the best type and make of machine . This may range from the machinery used in the Thal desert for levelling sand dunes to small garden tractors for use in East Pakistan.

149. Considerable initiative has already been shown by the Ministry of Food & Agriculture on some of these matters. They have controlled the numbers of makes of both wheeled and track type tractors, and, with the help of ICA, they have established workshops. Work is carried out by the Department of Agriculture on a contract basis, but this has mostly been for the well-to-do farmers and the whole effort is still small in relation to its importance. One reason for this slow progress has been the uncertainty as to the desirability of encouraging mechanisation, except for such uses as land reclamation. There has been, therefore, an extremely guarded approach to its extension or to any risk of wasting foreign exchange when human labour might do the job. There is another powerful deterrent, for the bulk of the population the application of machinery involves a problem of credit and credit on a very large scale, greater even than for the "five firsts".

150. On the subject of mechanisation then the country is at the cross roads. To ignore it may be to forfeit a valuable ally in the production war. To use it properly, competent investigation and patient build-up based on experience is necessary. As with so many other aspects of progress, success is likely to depend on the planned integration with mechanisation of a number of other aids to production. Without an organisation capable of handling it in this manner it could involve extensive disillusion and loss.

Irrigation

151. The enormous difference which irrigation can make to yields is

amply demonstrated in many parts of the world and we have already emphasised the fact that in both East and West Pakistan the country is blessed with tremendous supplies of river water. We have also in Chapter 4 touched on some of the difficulties which have arisen in its application. It is now necessary to consider the subject in greater detail in its different aspects and we do this in this section under the following headings:

1. Irrigation in East Pakistan
2. Irrigation in the Sub-Montane Areas of West Pakistan
3. Improved Water Use in the Canal Irrigated Areas of West Pakistan
4. Salinity, Waterlogging and Drainage in the Canal Irrigated Areas of West Pakistan

Irrigation in East Pakistan

152. The entire province is laced with a dense network of water courses branching out of the three principal rivers - the Ganges, the Brahmaputra and the Meghna. The total volume of water brought in annually by these rivers is estimated at approximately 925,000,000 cubic feet. These rivers and their branches are great assets of the province in many respects. There are about 2,700 miles of navigable channels open during the monsoon and about 1,800 miles open during the dry season. These water courses could provide the irrigation water during the dry season enabling a second or even a third crop to be grown in the greater part of the province.

153. The flood plains of the rivers are inundated during the monsoon and when the flood recedes, a large volume of water is retained in innumerable inland water reservoirs or pockets such as swamps, beels and haors, with which the whole countryside is interspersed. Some of these low lying pockets retain water during the entire year while others become dry during the winter season. The number of such beels and swamps is large and they are scattered over almost all the districts of the province. Their highest concentration, however, lies in the east of the Brahmaputra river in the districts of Mymensingh and Sylhet and the western parts of the district of Tippera.

154. These combined with the high rainfall mean that East Pakistan

is endowed with plenty of water resources and there should be no reason why crops should suffer for want of water. Yet crops do dry up, sowings are delayed and the yield is reduced for want of water. Various reasons contribute to this paradox. The limiting factor for East Pakistan's agriculture is an uneven distribution of the rainfall which divides the year into well-defined dry and wet seasons. 85% of the rainfall occurs during the five months from May to October. The flat topography of the land subjects it to flooding in the rainy season when about 70 per cent of the flat lands are inundated by rain or river water and the only crops that can be grown are rice and jute. In the dry season only a small part of the land is put under a second crop.

155. Although both aus and aman paddy are wet season crops their yield depends to a large extent on timely rainfall. Failure of pre-monsoon showers often causes low yields or even a total failure of aus crops. Similarly the yield of transplanted aman paddy can be seriously affected for want of late monsoon showers in September/October. Conversely early floods can destroy the broadcast aman crop and seriously affect the standing aus crop particularly if it is sown late, while late flood delays transplanting of the aman crop and this results in poor yields. It is thus evident that the limiting factors on production are lack of irrigation water in winter, droughts in the pre-monsoon period, early flood, sudden rise in the flood level and late flood and too early a cessation of the rains in September/October.

156. About 75 per cent of the land area is already under cultivation so that the scope for extending cultivable land is limited. However, by providing irrigation water to the high lands now lying fallow in the northern districts and by reclaiming areas in the coastal belts which are subjected to inundation, it is possible to bring more lands under cultivation. To increase the output per acre of lands already under cultivation irrigation is essential.

157. Of the total land area of East Pakistan 4,000,000 acres are

classified as culturable wastes. A substantial part of this area can be brought under cultivation by providing drainage and irrigation. Mechanised cultivation coupled with irrigation could bring even more land under the plough. It is estimated that with these improvements the cultivated area can be increased to about 26,000,000 acres from the present 22.2 million acres.

158. These facts indicate that irrigation together with flood control could bring about substantial increases in production by bringing more land under crops, by introducing double and triple cropping, by preventing saline ingression in coastal areas and by ensuring the supply of water in times of water shortage. Naturally it could also make all the difference to the efficacy of the "five firsts" and to the introduction of diversified farming.

159. Providentially also irrigation in East Pakistan can be carried out in a whole variety of ways, ranging from power pumps, tube and shallow wells, tanks, and minor irrigation and drainage schemes to several major canalisation projects. With this variety of opportunity its potential extends over a very large part of the country.

Power Pump Irrigation

160. In the districts of Mymensingh, Sylhet and Tippera there is a concentration of haors and beels and this area is commonly known as the "haor" area. The total area of this low-lying saucer is approximately 2,000,000 acres. Of this 700,000 are not available for cultivation, on a further 700,000 boro paddy is at present grown and about 100,000 acres are devoted to such crops as groundnuts, mustard and potatoes. The remaining 500,000 acres remain unproductive due to lack of irrigation although the whole area is intersected by a large number of perennial water courses involving only a low lift to bring the water up to the land.

161. During the first Five Year Plan, power pump irrigation coupled with mechanised cultivation was started by the Department of Agriculture, and an area of 40,000 acres has been brought under boro paddy cultivation. If these facilities were extended, and certain minor canalisation and

drainage added, the remaining area of about 450,000 acres could be brought into production. Outside the haor area also substantial surface water is available for irrigation throughout the dry season from channels and beels. By installing power pumps in these areas a successful second crop could be raised in winter.

162. The power pump scheme offers considerable scope for winter irrigation and it has the great advantages of being quickly installed and giving quick results as it implies neither large capital investment nor the delays which major projects involve. It should therefore command immediate priority. At present operational responsibility lies with the Department of Agriculture who hire out the pumps to farmers in winter on a custom basis. Initiative has been shown in starting this project which is looked after by the extension wing of the Department with specialised staff attached, but the number of pumps operating is too small and workshops and servicing are too meagre for the great potential which this scheme offers, particularly if associated with the provision of the "five firsts". The combination of engineering, irrigation and agriculture involved suggests the need of some special organisation to exploit its prospects satisfactorily.

Tubewell and Shallow Well Irrigation

163. In the northern districts of the province surface water is not available in quantity for power pump irrigation and the topography is too irregular for canals. The only possibility of irrigation in this area is through tube-wells, which is of course dependent upon ground water supply. An exploratory project for the installation of 50 tubewells was drawn up some years ago but only five have so far been sunk and the data from them is inadequate. The work, particularly the ground water survey, should be accelerated as tubewells, if economical and successful, could change the face of agriculture in this part of the province.

164. In most other parts of the province the sub-soil water is within easy reach and it can be profitably utilised for irrigating crops like

potatoes, chillies and vegetables from open lined wells. This method of irrigation is particularly suitable in the districts of Rajshahi, Bogra, Rangpur, Dinajpur and Pabna.

Tank Irrigation

165. There are thousands of tanks in East Pakistan which were excavated to raise the ground for village homesteads and also to retain water from floods for use in winter. Most of these tanks are now silted up and derelict, but if re-excavated they could serve as sources of irrigation in winter, particularly for vegetable crops. It would be the kind of productive project particularly appropriate for a local labour force, a suggestion referred to elsewhere in this report.

Minor Irrigation and Drainage

166. Various minor works can assist irrigation. In the low lying beels and haors all over the country, heavy rainfall is apt suddenly to inundate and destroy the standing crops. Many of such places retain flood water during the winter season als . If small channels were cut to drain the water from them into the rivers the cultivation of aman paddy could be undertaken. If small embankments were erected at the mouths of such channels with suitable regulating devices, they could be used not only to drain out the water to enable timely cultivation in the dry season, but also to prevent the onrush of water from the rivers during high floods, and also, where preferable, to retain the water for irrigation in the winter. Past experience has shown that the systematic undertaking of such projects could pay a valuable dividend and such works should be continued on an extended scale. Universal extension of this scheme would be particularly suited to the use of organised local labour force.

Major Irrigation Projects

167. A number of the major irrigation projects are now being undertaken or investigated by WAPDA. The most important of these are the Kushtia Unit of the Ganges Kobadak Project, the Second Unit of the Ganges Kobadak Project, the Khulna Multipurpose Project, the Teesta Barrage

Project and the Tangon Irrigation Project. In addition to these, there are several other projects in which flood control, drainage and irrigation are combined, such as the Brahmaputra Multipurpose Project and the Tippera-Chittagong Multipurpose Project. Work on most of these is still at the stage of investigation.

168. The Kushtia Unit and the second unit of the Ganges Kobadak Project provide for the irrigation of 1.5 million acres of land lying in the districts of Kushtia and Jessore by pumping water from the Ganges. In the Khulna Multipurpose Project, about one million acres of land lying in the saline zone of the Khulna district will be improved by the provision of embankments to keep off sea water and by supplying irrigation water from the Ganges through a gravity canal. At present only about 300,000 acres are cultivated in this area and are giving a very poor yield. The project envisages at least two crops a year from a net irrigated area of 570,000 acres.

169. The Teesta Barrage Project provides for the construction of a barrage across the river Teesta in the Rangpur district. It is estimated that an area of 1.8 million acres in the districts of Dinajpur, Rangpur and Bogra will be served by this project.

170. The Tangon Irrigation Project provides for the construction of barrages across the Tangon and Korotoa rivers in the Dinajpur district to irrigate an area of about 200,000 acres lying outside the Teesta command.

171. The Brahmaputra Multipurpose Project plans the resuscitation of the old course of the Brahmaputra river which passes through the Mymensingh district and of its spill channels for a controlled diversion of a part of the Brahmaputra flow to reduce the flood intensity in the lower reaches of the Brahmaputra-Jumna system, and to supply irrigation water to about 1.8 million acres of land in the districts of Mymensingh and Dacca. The Tippera-Chittagong Multipurpose Project provides for the utilisation of the Meghna river to irrigate about a million acres of land lying in the Tippera, Noakhali and Chittagong districts.

The Importance of Adequate Preparation & Education for Irrigation

172. These descriptions show what a tremendous scope for irrigation there is in East Pakistan. It is therefore all the more important to appreciate the conditions which are essential to its satisfactory use. In the projects planned and undertaken so far the main emphasis has been on the engineering side and very little work has been done on the satisfactory preparation of the land or on the education of farmers to receive and use the water to the best advantage. This lack is particularly conspicuous in the first major project now coming into action, the Ganges Kobadak Scheme, wherein 150,000 acres are due to receive water at the end of 1960. With the country now on the eve of a vast potential expansion in irrigation, preparatory work of this nature is of vital and immediate importance for power pump and tubewell schemes as well as for major projects.

173. The first desirable step is, of course, consolidation. Most of the arguments which apply in this respect to mechanisation apply with even greater fprce to irrigation. It is possible to put water on land in its present fragmented pattern, especially where all are growing the same crop at the same time, but to do this may forfeit the opportunity of getting the land properly levelled and getting the water courses laid out in the most economical and efficient manner for distribution and easy maintenance. It may also preclude the opportunity of diversified farming which should be one of the major objectives of irrigation. As stated, present conditions of fragmentation mean that for the majority there is no basic farm at all, merely a haphazard collection of scattered plots. The introduction of irrigation affords both an opportunity and a strong reason for bringing these together so that they can at last become manageable farm units. This opportunity must on no account be lost.

174. In addition to consolidation, levelling and an effective system of field channels to distribute water evenly are essential. Examples were seen on the Ganges Kobadak Scheme where water was being applied direct

from a minor canal without this preparatory work. As a result adjacent low-lying areas were being excessively flooded while a short distance away the land was dry as the water could not reach it. Such conditions of usage made a sorry contrast with the nearby modern power station, complete in all its details, and proved that expensive and well-executed engineering achievements are only part of the problem. Unless the end-use is efficient the object of such works is largely frustrated.

175. The main reason for this state of affairs is that so far it has been nobody's business to deal with the agricultural side of irrigation. The farmer has been expected to do that himself. But the East Pakistan farmer has for ages been accustomed to cropping with rainfall only. Efficient use of irrigation water is a new concept to him and the need for levelling and for taking land out of crop use to make field channels is liable to be resisted. The whole process involves not only joint planning but also extra work and extra expense. There arises, therefore, a multiple problem of education, organisation and technical assistance, and credit.

176. A second condition, after consolidation, for satisfactory irrigation is thus the creation of a service which can demonstrate to farmers how to level their lands and lay out their field channels to the best advantage. For this purpose it will need to provide credit and possibly also to execute parts of the work and recover the cost from the farmers later. Such a service would be far more effective if it was also responsible for the provision of the "five firsts" and the supervision of their application.

177. Following this preparatory work, farmers will have to be advised on the cropping systems most suitable to their areas and the frequency and depth of water required for the various crops. Advice of this kind cannot be given until the knowledge has been obtained by experimentation and tried out in pilot schemes to discover the possibilities and requirements of new crops and new rotations. Extensive demonstration would then be required as there may be great advantages in insisting upon all the farmers in a particular zone aligning their fields of major crop in such a way

as to assist the maximum economic use of modern techniques and the even distribution of water. Work of this kind has been started on the Ganges Kobadak Project where there are now in operation an experimental farm (Amla), a demonstration farm (Baradi) and a pilot irrigation unit (Bheremara), but these are tiny areas compared even with that project and they are the only ones in the province.

178. The conclusion to be drawn therefore about irrigation in East Pakistan is that tremendous potential exists for increased production by its use but that the difficulties in the way of its satisfactory application go far beyond engineering problems. What is needed above all is preparation of both land and farmers in advance of the actual supply of water. It is a tremendous task and one which, once again, demands a blend of research, extension, supply and credit, planned and organised together and synchronised with the engineering works.

Irrigation in the Sub-montane Areas of West Pakistan

179. Outside the main canal irrigated region of West Pakistan, there is in the barani lands considerable scope for small scale irrigation. Development of this potential, by means of tubewells and open wells and by small dams, is particularly desirable in Sialkot and Jhelum district. This is an area of traditionally good farmers and good land and under ground resources of sweet water are thought to be extensive. This part of West Pakistan comes closest to conditions of East Pakistan in population pressure, fragmentation, small holdings and low incomes.

180. In contrast with those estates in the Punjab and Sind where large landowners can be encouraged to invest in tubewell development, the initiative here must lie largely with government and the accessory needs are very similar to those in East Pakistan. Consolidation, mechanisation, discovery of suitable crops and rotations, and guidance to farmers on how to utilise irrigation to the best advantage have the

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same importance and demand the same specialised attention. A planned programme for tubewell and open well irrigation here has the advantage of cheap electric power.

181. All over the barani lands of West Pakistan, the nullahs and gullies afford almost endless opportunities for small irrigation dams. Works of this kind can also trap soil and create new fertile fields in the stream beds. Executed on a sufficient scale, and taken in conjunction with improved grazing control, they can restore dry torrent beds to perennial flow, reduce the flood menace and increase the country's water supplies. The vastness of the scope the difficulty of controlling stock and the shortage of working people in the huge areas involved place this whole problem in a different category from those just discussed. But the activities are important and in a country like Japan, where stream control has reached a high degree of perfection, the great benefits have been amply demonstrated. Pakistan can no longer afford to leave this problem untouched. It calls for some special organisation of the nature of a labour corps for executing such public works.

Improved Water Use in the Canal Irrigated Areas of West Pakistan

182. The need to educate the farmer in irrigation methods has been particularly stressed in regard to East Pakistan because irrigation is being introduced there for the first time, but even in West Pakistan faulty water use is one of the reasons for poor yields. It is still generally true that an irrigation project is regarded as completed, as far as the national interest is concerned, when the engineers have provided water at the canal outlet points. This tradition must be combated. In the urgent need for production today, it is futile to engage in vast expenditure on river barrages and canals and then leave the end product to the chance activities and inclinations of landlords and farmers. The unsatisfactory results of this policy of leaving it to the farmer can be seen in many parts of West Pakistan, where inadequate

levelling has resulted in high patches being left dry and low patches excessively flooded, and where the haphazard alignment of field distributaries, along the boundaries of fragmented holdings, has resulted in inadequate discharge, inefficient maintenance and heavy water loss.

183. There is a need for a thorough overhaul of these field distribution systems, for improved levelling, for experimental trials with lining water courses after their final alignment, and for investigation in to whether water can be saved and yields increased by ridging, a practice curiously absent in West Pakistan. There is a need , at the time of lay out of field distributaries to suit these to the requirements of machanisation and soil conservation and to allow for field access roads. Finally there is a need to quicken the whole process of land development for irrigation in West Pakistan. The pace that suits the purse of the landowners is not necessarily good enough for the nation.

184. Not all schemes are bad,. The rectangulated layout of the best colonisation areas of the Punjab, and some of the highly mechanised farms like the Isa Khel Estate in Rahim Yar Khan, are excellent examples of levelling and field layout which, if applied generally, would substantially improve the efficiency of irrigation. Some of the worst places are the newly irrigated private lands in the non-perennial areas which used to be used mainly for cattle raising. These lands are not levelled nor have they good water courses, for such people are only just starting to be farmers. But wherever irrigation flows, a main need is to replace the concept that irrigation is just an engineering business by the conviction that its end use for farming is what matters.

185. The fully productive use of scarce water is going to be a national necessity in West Pakistan. The nation cannot afford to leave landowners or farmers indifferent to such an important matter or unable to meet its requirements. There are plenty of places in West Pakistan where the type of extension service, combining the best irrigation

techniques with the five firsts' suggested for East Pakistan would be equally necessary.

186. One of the problems, after provision for levelling and improved layout of water courses, is to discover what are the optimum water needs of different crops, and how these needs can best be satisfied. The traditional basis for the allocation of water, allows, on perennial canals, a cropping intensity of 25 per cent in the kharif and 50 per cent in the rabi season. We have described how the theoretical cropping intensity tends to be exceeded under population pressure so that the spread of water per cropped acre, already thin, becomes even thinner. We have stated that this is a major cause of low yields and increased salinity and a discouragement to the use of aids to increased production like the "five firsts" because in these circumstances they are uneconomic. What is required now is a completely new outlook on water needs of crops and an investigation into what is required to give optimum yields. Now that the intensive use of fertilizer is possible and fallows be far less necessary, improved mixed farming rotations may replace the old concept of a non-intensive rotation.

187. Two questions will arise out of these investigations and neither is easy to answer. The first will be from where can additional water be found. This will involve consideration of the supplementary potential from tubewells, from storage dams, and from the greater use of flood water in the rivers which at present goes to waste in the sea. The second question will be how best to remodel the existing canals or provide new ones to carry the additional water

188. The increasingly dire need for water will warrant at the same time thorough review of the equity of the present system of water distribution, with special attention to the efficiency of canal clearance and maintenance and the timing of canal closures and the

Need for lining of canals. These matters have a great effect on the level of crop production.

189. From many aspects, therefore, the need for improved water use makes investigation, review and the establishment of an organisation which can deal with the farming requirements of irrigation particularly imperative now in West Pakistan. Such action is in any case essential because of the implications of the salinity, waterlogging and drainage problems which are discussed in the next section.

Salinity and Waterlogging in West Pakistan

190. A description has been given in the preceding chapter of the very serious position in West Pakistan caused by salinity and waterlogging. The generally accepted reasons for the development of salinity and waterlogging briefly are, that the alluvial soils of the valley usually contain free soluble salts. When irrigation water is applied in a lesser quantity than is required to maintain a downward movement of the moisture and the salts in the soil, then evaporation plus capillary action brings the salts in increasing amounts to the surface. After some time, the concentration of salts on the surface is such that crops cannot be grown successfully. The situation is made worse and the rate of spread is accelerated by a rise in the level of the water table. In some places this has reached the surface or near surface and has resulted in waterlogging. The rise in the water table is due to excessive seepage from the canal and irrigation system, floods, and impeded drainage, and is proceeding at the rate of about a foot each year. The nearer the water table containing salts in solution is to the surface, the greater are the possibilities of its upward rise and so of the development of salinity. Water tables within ten feet of the surface, in saline soils, are generally considered dangerous in Pakistan though in many other countries five feet is considered safe and tile drain systems, frequently operate at this depth.

191. This rise in the water table could have been prevented or controlled if a suitable drainage system had been installed at the same time as the canals. At present the lack of even adequate surface drains to control flood water is accelerating the rate of rise of the water table.

192. As salinity is caused by too small applications of water to crops and by a high water table the cure or prevention should be a higher water application and a lowering of the water table. Trials on a considerable scale in a number of districts to test this assumption have been carried out by the departments concerned. It has been found that affected lands can be reclaimed by the leaching down of salts through heavy application of water. An additional 20 percent of water above that needed for maximum crop production is considered necessary to do this efficiently. Some lands have been temporarily reclaimed and made fit for crop production by giving a higher application for three years and then reverting to lighter applications. After a few years of lower application, however, the salinity tends to return. What is required is a continuous heavy application of water to wash away the salts. Leaching, however, cannot be effectively carried out if the water table is too high and in such circumstances drainage is essential.

193. Drainage of course is an effective remedy for waterlogging. Various methods have been tried on an experimental scale: tubewells, seepage and surface drains of different types and combinations of these, and have been found to be successful.

194. Difficulties in the way of applying more water are that the canal systems have been designed to give water at the rate of one cusec to over 300 acres of cultivable land whereas it is considered that water at the rate of one cusec per 150 acres or preferably per 100 acres is required to keep the salts down and the soil in a productive condition. Thus the additional water cannot be supplied from the present canals without abandoning a large proportion of the land at present irrigated. If this was done it would entail great hardship on the people affected. An alternative would be to increase the capacity of the present canals or to build additional canals.

Such works would, of course, be extremely costly and, except in the

summer flood season, there would be little additional water available to fill these canals as the present systems in operation or under construction are designed to use almost all of the normal (non-flood) flow of the rivers.

195. Urgent consideration must, therefore, be given to the better uses of available water and to the finding of additional supplies. Deep tubewells to draw on the ground water are being tried on a considerable scale; projects already in hand provide for some 2,800 of them. They can serve the double purpose of lowering the water table and supplying the much needed additional water. For this latter purpose the ground water must be sweet or contain so little salt that it can either be used direct or with an admixture of canal water. Where ground water is strongly saline tubewells can be used only for drainage, and this may be so expensive as to be uneconomic. Careful surveys of the availability of ground water, quality and rates of replenishment will be essential in planning the siting, spacing and number of tubewells. Such surveys are now being carried out on a very extensive scale in all canal irrigated areas.

196. It has been suggested that greater use could be made of the summer flood waters which at present run waste to the sea. This would entail increasing the capacity of the present canals or constructing additional systems. Flood waters are available for two or three months of the year only and their best use would probably necessitate changes in crops grown and in the cropping systems. This however should present no insuperable difficulties and investigational work and pilot schemes should be planned with a view to obtaining full information on the subject as early as possible.

197. Large storage dams are being constructed for hydro-electric and other purposes in the upper reaches of the rivers. These will hold up considerable quantities of flood waters to be released and become available for irrigation throughout the year. This should be of some help, though

the quantities relative to the total requirements may not be great and silting of dams may make supplies temporary. Meantime, in view of the urgent need for additional water other storage dam schemes might be considered particularly on the tributary rivers.

198. Another scheme being considered is the combination of the canal and drainage systems. This will obviate the need for long canal systems high above the land, which are one of the chief causes of waterlogging. It might also ensure adequate drainage at little extra cost.

199. Drainage to keep the soil in productive condition is required in all areas. The type of drainage may be pumping from tubewells, seepage drains or surface drain or more usually combinations of these. The best method of drainage will be determined by the type of soil, the slope of the land and the salinity of the ground water. Open drains do not help much in lowering the water table and tubewells do not meet drainage requirements in all conditions. It is said that the very flat nature of the land makes tile drainages very expensive and complicated. Much information is being acquired on methods of drainage but as yet no large areas have been freed from the danger of waterlogging.

200. As has been said, cropping systems and cultural methods will have to be adjusted to heavier application of water or water availability at different seasons. Some work has been done on irrigation requirements at Lyallpur (though little use has been made of the results) but much more basic information is needed on the amount of water required by various crops on different soil types for maximum yields and on the amount of water needed to keep the soil in condition for maximum and sustained production. There may be conflict of these two requirements in the early stages and research by teams of agronomists, soil scientists and plant breeders to discover varieties and cropping systems suited to the new conditions should be begun early. Similarly research will be required for varieties of crops to make the best use of flood water and perhaps of slightly saline water.

201. Whatever action is decided upon by the experts to control salinity and waterlogging, it must again be emphasised that the matter is extremely urgent. There are no easy or inexpensive solutions and the need for heavy expenditure must be faced. Neither the "five firsts" nor the more long term methods can give increased yields where salinity persists.

202. In view of the great national risk and of the very heavy cost, the management of the land and use of the irrigation water cannot be left to the individual untutored farmer. It is essential that, when additional irrigation and drainage works are provided strong agricultural supervisory and extension services be set up to ensure the correct use of water and the laying down of cropping systems which will give the highest yields. Such a service should also have the responsibility of ensuring that all land is, as far as possible, levelled and that consolidation of fragmented holdings is organised; these measures will further help to ensure maximum returns from these lands on the development of which so much money and effort has been spent.

Reorganisation of the Farming Systems

203. Farms are very small in size in many areas and consolidation and improved farming systems, though they bring many benefits do not increase the size of the holdings. On each of these small farms the individual farmer determines his own cropping system and lays down his own cropping pattern each year. This results in a multitude of very small patches of different crops scattered irregularly over the area and makes it almost impossible to get the maximum benefit from such things as irrigation water, farm machinery or large scale plant protection measures. The question of access roads to such plots also presents problems. If the multitude of small plots could be rearranged into large solid blocks or into contiguous strips, then much labour and water would be saved and much more use could be made of modern equipment.

204. Consideration must, therefore, be given to systems of farming where the benefits of large scale operations and of modern farming methods

can be enjoyed. Some of the best crop yields in West Pakistan are obtained on large well-managed estates where although the land is farmed by tenants operating individually on small acreages many of the advantages of large scale farming are obtained. This is done either by (a) dividing the land into large blocks each of which is allocated each season to one crop only and in each of which tenants have their individual plots or (b) so arranging the layout of the tenants' farms and the rotations to be practised on them that the individual plots of any one crop form contiguous strips through the estate. The success of these farms is dependent on the planning, the organisation of supplies and the general supervision which is provided by the management. These examples suggest that it might be possible to organise groups of farmers, probably all the farmers in a village, in such a way as to get most of the advantages of estate cultivation and modern techniques.

205. The results obtained on joint or collective farms in other countries are not encouraging. Farmers everywhere are intensely individualistic and the incentive of working for themselves on their own land outweighs most other considerations. What is required is a system which allows them to do most of the work on their own land and to retain their own crops but at the same time requires them to farm according to an agreed system and a planned pattern. If they accept the guidance and direction they will be able to secure the benefits of planning and management, the loan of improved implements and, where necessary, of heavy equipment, the organisation of farm supplies and the joint marketing of crops.

206. A plan has been put forward by Dr. Otto Schiller, FAO expert on cooperative farming, in his report entitled 'Individual Farming on Co-operative Lines'. Individual farming on cooperative lines is defined by Dr. Schiller as follows:

> All the functions which cannot be executed in the limited boundaries of a single small farm or beyond the capacity of the small holder, such as planning including field arrangement and cropping scheme, the keeping of large sized equipment, the wholesale

> supply and marketing etc. should be turned over to the cooperative society for improved individual farming. All other functions of farm management which can properly be executed within the boundaries of a single small farm should remain with the independent individual.

This scheme would appear to be worthy of a large scale practical trial.

207. There are a number of farms in the Multan area, designated as cooperative farms, which have been set up in new canal settlement areas. In this the cooperative society takes the place of the landowner, the tenants are all members of the society and pay their rent or share of crops to the society. The society buys supplies such as fertilizer in bulk and distributes to members, it keeps a stock of improved implements which are available on loan and it uses its funds for supplying general amenities to the community e.g., mosques, schools, sanitation, tube-wells. These societies are good as far they go but their weakness is the lack of any guidance in cropping or any supervision in farming methods. Additional benefits and funds might also accrue if the society undertook the marketing of produce for its members.

208. There is no doubt whatever that in the overcrowded areas of East Pakistan and the sub-montane region of West Pakistan the situation requires very careful study. Perhaps future action should take the form of integrating small units into estates. Perhaps cooperative farming in some form will give the best results, or perhaps a supply, credit and marketing organisation may be all that is required.

209. By merely organising credit, supplies and marketing, Japan and West European countries like Denmark and Holland have been able to secure very high yields and good returns. Such farms are heavily manured and fertilized and are managed like market gardens. In the vicinity of larger population centres, the development of such farms should be possible provided that credit, supplies and a marketing organisation are made available.

New Colonisation Areas

210. We stated at the beginning of Chapter 5 that the New Colonisation Areas showed many of the aspects of the existing cultivated areas, but we were dealing with them under a separate heading because they offered important organisational opportunities not easy to apply in existing cultivated areas. It is here that it ought to be possible to plan from the start for the introduction of the whole range of techniques described in the section headed Re-organisation of the Farming System. Starting with a blank sheet, the opportunity is present to lay down for each farmer, not only a standard unit farm, as in the old colonisation projects in the Punjab, but also to prescribe conditions against sub-division and fragmentation. It is also possible to insist that the units, although individually operated for purpose of profit and for much of the cultivation, conform to a layout and rotation which will give the maximum opportunity for the joint application of modern aids to production. With such a base it is possible to supply aids through a managerial service which can also control the processing and marketing and thereby give to the farmers the best chance of both high yields and high incomes.

211. It may be desirable at first to confine developments of this kind of full scale vertical structure to regions where a cash crop like cotton or sugar can be grown. With intelligent management, control of quality and purity can considerably enhance the price and thereby give the farmers a feeling of substantial benefit in return for putting up with planned farming. Control of processing involves more certainty of the delivery of the cash crop and thus of recovering loan outlays on the various aids. Delivery of food crops which need no processing may be more uncertain, and the price benefit may be a lower inducement to accept the technical rules involved in progressive farming of this kind. In time, however, with a lead from the cash crops, farmers should become accustomed to utilising joint services for all their crops.

212. Projects of this kind are usually thought of in terms of cooperatives,

as is the case with " Dr. Schiller's proposals" mentioned previously and with the cooperative farms in the Multan area. The point which we wish to emphasise here is the benefit which can be derived from a joint managerial structure, whether cooperative or not. A pattern analogous to the present conditions of Pakistan may be seen in the Gezira Irrigation Scheme in the Sudan. This is a vertical structure project of the nature already described, based on cotton as a cash crop. It was deliberately designed to bring the benefits of large scale estate management to a society of peasant farmers. It has now been operating for 35 years and covers nearly two million acres and over 50,000 farmers. It has been of considerable financial benefit both to the country and to the farmers concerned, and is being used as a prototype for extensive irrigation development in other parts of that country both on state lands and on private estates. The Sudan has a climate very similar to that of the Punjab, and offers, therefore, a practical demonstration of the planned agriculture of the kind which we are advocating.

213. There are a number of traditions in colonisation policy in Pakistan, particularly in relation to the disposal and use of land, which will need adaptation before concepts of this kind can be successful. Originally, when colonisation started, inducements were needed to persuade people to go into new areas, and a freehold title, carrying with it the concept of a possession which a man could use or neglect as he liked, was one of the attractions. Although today the position is reversed and there are numerous applicants, the tradition of such a right persists, and has been enhanced by other factors. One of the main features of Government policy in developing the irrigation areas was to recover the financial costs by spreading water over as much land as possible, and sales of Government land were made irrespective of the capacity or inclination of the purchaser to develop it. This system continues to this day. In addition, different classes of people have had to be accommodated for various reasons in land allocations. There has always been a traditional custom in Government of rewarding individuals or classes, deserving of the nation, by grants of land. There has been a need to provide

alternative land for excess population from overcrowded or saline areas where freehold rights are already enjoyed. There have been the claims of refugees from India for rehabilitation. Finally there has been considerable and reasonable doubt as to what is the best method of colonising new areas. In these policies the long term interest of ensuring that the buyer is going to be an effective producer is not represented, nor is there any planned agriculture or emphasis on the duties as opposed to the rights of ownership.

214. The allocation of certain parts of new colonisation areas for experimentations in establishing of proto-type planned productive farming of the nature described is particularly desirable. Adaptation to such forms will not take place naturally in present circumstances, but, if the benefits can be demonstrated, it will be much easier to persuade people to apply these methods, not only over the rest of the colonisation areas but also gradually in other areas, and not only on state lands but also, as in the Sudan, on private estates.

215. The Gezira Scheme in the Sudan is operated on a share partnership basis as far as the cash cotton crop is concerned, but the shares are determined not purely on the criterion of land ownership but in accordance with the capital and labour input and the services rendered. We have emphasised in Chapter 4 that the current systems of land tenure and share cropping now frequently operate as disincentives to increased production. If such systems can be adapted to a more equitable relationship of capital and labour input in which the duties of both owner and tenant are defined by contract, a very great improvement in the return to both landowners and tenant and so to the nation should be possible. Experimentation to discover successful proto-types has therefore a value not merely on state lands, or merely as a prelude to cooperative groupings of small peasant proprietors, but also to the landowner tenant relationship on large private estates.

216. We have no doubt, however, that it is the agricultural usage which should dominate the planning in new colonisation areas in future. We repeat our convintion on the futility of regarding new irrigation projects from the purely engineering standpoint of dams and canals, and of tolerating after

their crops. They offer ideal conditions for the planned application of the "five firsts", the introduction of the block system of crop rotations, of mechanical aids and the establishment of a link between credit, marketing and processing - in fact of every thing needed to build up a prosperous and highly productive community.

The same planning and methods of operation could be used to some extent on the land resumed under the land reforms and could also demonstrate the possibilities of improvement in older colonisation areas.

Range Lands of West Pakistan

217. The present condition of the range lands of West Pakistan has been described in Chapter 4. The land use problems in these range lands are similar to those found in arid grasslands in many other parts of the world. Production is low, because rainfall is low and life is hazardous because even the low rainfall is erratic and there is an ever present risk of starvation for flocks and their owners. In the best of years, grazing is abundant only during the short rainy season and for the remainder of the year the animals must subsist as best they can on dry grasses, shrubby growth and, in very limited areas, stubbles and crop residues.

218. The areas are grazed throughout the year and they have presumably been used in the same way for thousands of years. It is perhaps open to question whether they are becoming less productive at present because bad grazing management has persisted for so long that superficial examination suggests that a biological balance has been reached at an extremely low level of productivity. There are certain areas which could not become much worse no matter how they are treated now.

Improving the Grazing Lands

219. In any programme for range development, the extent to which degradation of the vegetation has occurred must be assessed. Determining the types of succession for a given environment and the stage reached in any given area provides a wealth of information on the potential for improvement. Thus a detailed examination of these conditions should be

made early.

220. The technical approach to improving grazing lands is well known; it is based on the general principles of grassland management which have been employed in Western Europe for many years and which have more recently been modified and developed in relation to arid grazing areas, particularly in Australia and the U.S.A.

221. Of particular importance in arid areas is the conservation and planned use of all possible supplies of water. This includes the provision of drinking water for flocks and the development of irrigation by wells, by diversion channels from nullahs, and by small dams and reservoirs. While the development of water resources is important, it is also important that this development be related to a more rational and controlled use of the grazing and other resources. Attention to this would limit the hazards facing the livestock producer and ensure that the specialised forms of production which the range lands have to offer - primarily meat, wool and hides - contribute as they should to the wealth of the nation.

222. If the establishment of new watering points means that new areas, which to date have escaped overgrazing because of their distance from water, are subjected to the same overgrazing, little will be achieved. If new sources of irrigation water are used merely to produce subsistence crops of cereals, the position will remain unchanged. It must be appreciated that the range areas should be devoted to their best use - livestock production on a sustained basis. Basically, two things are needed, first, grazing must be controlled and managed so that the vegetation has a chance to recover and so raise the stock carrying capacity. Second, it must be realised that no high level livestock industry can emerge while it is completely dependent upon the vagaries of an unreliable climate. Fodder reserves must be built up to help feed the livestock in the lean months of the year and in lean years. Such reserves can be supplied only by the irrigated arable lands (this includes both sailaba cultivation and perennial flow) and thus these lands must grow livestock feeds to enable a much

larger surplus of livestock products to be sold to other parts of the country, even though this means that foodgrains for human consumption have to be bought in exchange. Government assistance in supplying reserves of grain for livestock in periods of famine should receive consideration.

223. Re-seeding range lands with both local and exogenous species could be carried out to speed up the rate of range improvement. However, without additional water in the form of irrigation or flooding, it is doubtful whether reseeding will be either profitable or worthwhile where the rainfall is under 12 inches.

224 While the conservation of soil and vegetation through proper range management and the best use of water is basic to range development, there are other important features including better management of livestock and the control of diseases and parasites, for which the owners must be given adequate veterinary help.

Marketing

225. Efficient production of livestock will not, however, meet the requirements of the situation if proper marketing is neglected. The present situation leaves much to be desired and it is certain that much wastage and loss could be avoided if marketing methods were improved. This would be of benefit to both producer and consumer. Improvement of communications will be an essential feature of any marketing improvement.

226. A particularly attractive prospect, which has not yet been encouraged officially, is the fattening of range animals, prior to marketing, on irrigated fodders or sown pastures near the consuming centres. Instead of bringing in the lean animals from the range for immediate slaughter, they could be fattened to increase the ratio of meat to bone in the carcase. By this means Pakistan may be able to meet, to some extent, what is otherwise likely to be a chronic shortage of meat. As discussed in the section on mixed farming, the competition for land between humans and animals is such that it will be only the most efficient ways of producing foods of animal origin which will succeed. This applies particularly to

the production of milk, but if range lands are used to produce the lean carcases of cattle or sheep it may be very profitable to fatten the animals on irrigated fodders.

Livestock Improvement

Cattle

227. The approach to cattle improvement has already been considered under "Animal Husbandry in Improved Farming Patterns". Briefly what will be required of the range areas is that they should, where they can, be associated with intensive agriculture and rear the young stock and replacements for other areas. Since the priority should be given to milk production, the aim in cattle breeding might be to breed a triple purpose animal for milk, draught and meat, which could stand up to range conditions.

Sheep.

228. There are many recognised breeds of sheep throughout the country and little has yet been done to investigate the potentiality for improvement through selection and breeding. The close relationship between the breeding of better livestock and the management and care of animals cannot be over-emphasised; to attempt the former without sufficient attention to the latter is futile. As with cattle, the question arises of the advisability of crossing local with imported breeds. At the present time, Pakistan imports considerable amounts of fine wool while exporting larger quantities of high quality carpet wool. It seems to be generally accepted that importation of finer wool breeds is necessary for the rapid improvement of the quality of wool in selected areas, but there is also some indication of the possibility of breeding finer wool from the local animals. Improvement in yield and quality of the carpet wool is certainly possible, but as with other livestock, this is to a large extent linked with improved management. As discussed in the improvement of cattle it will be advisable to have the advice of a recognised world expert in this field before proceeding further.

Goats

229. Some earlier comments on goats were made in relation to East Pakistan, but here, the much more controversial problem of goats on the range must be dealt with. It is considered that the complete elimination of the goat would not be desirable because of its effect upon the economy of the grazing areas. The reasons for this apparently unorthodox statement briefly are set out here.

230. The goat is not the cause of bad land use, it is an expression of it. The goat is often the only animal that can obtain a living in badly damaged grazing lands and under prevailing systems of management, and it is certain that the axe and fire have done more damage to forest than the goat. In areas where there can never be profitable forest there would seem to be no good reason for removing the goat. Other animals, including sheep, can be more harmful. The aim in any case should be good grazing management and not the elimination of a useful species.

231. In Cyprus a campaign for the elimination of goats has been waged over the past 50 years in villages next to forests and has met with 60-70 per cent success in reducing wandering goats from forests. It has, however, also had a serious depressing effect upon the income of the villages concerned. Only recently has the situation improved with encouragement of alternate forms of fodder production on arable areas combined with the encouragement of the keeping of sheep and improved quality "tethered" goats. The inference is, therefore, to remove free-ranging goats only where they cause damage that other animals would not cause, and only when alternative forms of production are feasible.

232. Full support is given to proposals put forward to improve the quality of the goat and to consider it, as has so often been quoted, as "the poor man's cow". In addition to the excellent quality of local milking types, breeds which might well have possibilities include the Damascus for lowland and foothill areas and Swiss type such as Sasnen and Toggenburger for the uplands. Such animals could be controlled in their grazing or brousing.

General Considerations

233. While the technical problems met with are essentially similar in different areas, a complicating feature is the social organisations and their impact upon any solution. It is convenient to divide West Pakistan into two areas on this basis. West of the Indus lie the tribal range areas, while to the east, the grazing areas are operated village by village. For convenience of description they are divided into the Western and Eastern Range Lands and discussed separately.

The Western Range Lands

234. The adoption of new methods of utilising the grazing lands must obviously be dependent upon their acceptance by the tribal peoples and any solution must take into account the peculiar needs of the people themselves. Unfortunately the conflict between technical requirements and social organisation presents difficult problems. Different grazing systems are in operation including (a) free range grazing over demarcated tribal areas, and (b) seasonal transhumant flock movements. The latter include (i) movements from winter to summer grazing within Pakistan, and (ii) the movement of Powindahs or Afghan nomads, who are also transhumant graziers, moving from summer pastures in Afghanistan to winter grazings in Pakistan.

235. The approach to improving grazing under system (a) should be the adoption of the straightforward techniques for range land improvement. The potential for improvement has been shown by the data obtained at the Muslakh Range Project, which is a joint Forest Department/ICA venture. This project has been criticised because of its size (115,000 acres), high cost and the low grazing potential of the site. While these criticisms have some force, the project has shown that improvements can be made in the productivity of the grazing and the animals. Protection has been carried out progressively. The first area has been managed by the Forest Department and the second will be utilised cooperatively by nearby tribal people on the basis of the grazing experience gained to date.

236. Several other projects are in different stages of development and vary in size from a few acres (Ziarat) to 50,000 acres (Nushki). All but one (the Yataabad project under Animal Husbandry) are being developed by the Forest Department. Range reseeding has been given some prominence in these trials. Preliminary work such as that carried out may be essential, but in extensive areas the cost/ benefit ratio must not be lost sight of.

237. The possibilities of a somewhat different and certainly cheaper approach were indicated by an FAO expert, who, during the course of an assignment in Pakistan, organised a community development programme including range management in the Isplinghi valley with the assistance of personnel of all the interested departments (agriculture, forest, animal husbandry, public works medical, etc,). This approach, which attempted to show that development could take place with the help of progressive tribal chiefs seems to offer a real prospect of success. Unfortunately with the departure of the expert the scheme was abandoned. Its closure indicates the importance of overall and continuing planning and action.

238. The apporach to b(i) may not be too difficult, since the graziers concerned are citizens of the country and are, therefore, subject to some control. Information is needed on the movements of flocks and herds and when this is obtained attempts might be made to encourage the maintenance of fodder reserves, and with these, limit the intensity of grazing at the halting points and control the time of movement of flocks along traditional routes. Change from one route to another might be possible to give periodic rests, and certainly departures from the starting

point in early winter could be delayed so as to prevent premature grazing on the new green growth.

239. The Powindah problem (ii) is only partially technical since it depends very much upon political considerations. As far as the Powindahs themselves are concerned, they are merely moving back and forth in a time-honoured rythm. From the purely technical point of view there would be much to recommend the complete exclusion of both human-beings and herds; not only do they destroy the grazing, but they may bring both human and livestock diseases. The recent epizootic of African Horse sickness is a case in point. The Commission considers that this immigration is against agritural interests and should be completely banned.

The Eastern Range Lands

240. The sociological problems in these areas are apparently far less intractable and it should, therefore, be easier to approach the technical difficulties. In many areas the possibility of tubewell development exists and thus of the production of fodder and pastures as well as of stock watering points. Surveys of the hydrology and vegetation would be particularly important in determining the ultimate method of use, but it might well be found that division of the area into blocks of varying size, according to water availability might be the best approach. A number of proposals such as this have been made, but it is considered that there is need for more survey data before serious attempts at laying down policy are begun.

Appraising the Overall Problems

241. Valuable assets are now being wasted in Pakistan by the neglect of the grazing lands. This has been recognised for some time, and

recently some very useful work has been carried out on the problems involved by government departments, international agencies (UNESCO and FAO) and bilaterally, by ICA. But while much valuable information has been collected little impact on actual production has been made. The reasons for the limited progress include the lack of overall coordination and the general lack of interest and finance.

242. The need for surveys of resources has been recognised and a pilot survey was made in the Isplinghi valley which includes information on geology, geomorphology, paleantology, and climate. Climatological data included the recording of wind power with a view to the possible use for windmills. Further surveys to include also data on livestock population and sociological studies, with outside help if necessary, will be an essential preliminary to long term development.

243. Coincident with the survey will be the need for well planned pilot projects designed to investigate the best ways of adopting improved technical practices within the varied sociological framework. The adoption of the numerous projects already started could be considered, but it might well be found that some of them are unsuited to investigation of the problems which must be solved.

Hill Catchment Areas

244. The extent, location and general description of these areas were given in Chapter 4. The problems are general throughout, although the intensity varies, usually in relation to the remoteness of the area from the more populous parts of Pakistan.

245. The most obvious problem is that of communications, although this varies, and is far less acute in the Rawalpindi district than in Chitral. In the former there are tarred main roads which are always open, while in the latter snow cuts off contact with the outside world other than by air for 10 months of the year. Even during these two months, roads can be traversed only by Jeep or Land Rover. Away from the main roads, movement is restricted largely to pack animals or human foot and the bringing

in of goods and the taking out of produce are severely restricted. As a result most areas concentrate on self-sufficiency although the technical possibilities exist for kinds of produce which, if they could be delivered, would fetch high prices in consumer markets.

246. The most readily available form of wealth is timber but its extraction is dependent upon good road communications, as the rivers are unsuitable for floating logs. This is perhaps a blessing in disguise, as when opportunity for extraction occurs, it is frequently abused. The timber is clean felled and little thought is given to the future. It may be that the Forest Department will now be able to control fellings, but certainly the employment of a robber economy in the past has brought about many of the present problems of soil erosion and flooding by destroying the vegetative cover. Combined with this clean felling has been overgrazing which has given vegetation no chance to recover. This mismanagement which has caused erosion in the hill catchments, is ultimately responsible for much of the flooding in the plains.

Development

247. Any development must make use of the "five firsts", but while it will not be difficult to provide these in the areas near the roads, the physical difficulties of getting supplies, fertilizers for example, to inaccessible villages will be almost prohibitive as will be the cost of transporting them. However, a large measure of improvement can be brought about by raising the yield of the existing forms of production in areas where the "five firsts" can more easily be applied.

248. The long term policy must be the directing of the region away from subsistence cropping to the production of higher value crops. The grazing areas represent a considerable asset which must be developed in a balanced manner. To do this there must be grazing management and at the same time the production of fodders on arable land to provide for periods of scarcity. As discussed elsewhere, fewer better quality animals, properly managed and fed, will produce far more than greater numbers

of neglected beasts. Pasture production on what are now eroding arable areas on ill-constructed terraces should be a permanent form of use.

249. The market in Rawalpindi for meat, milk products, top quality deciduous fruits, nuts, vegetables, etc. should be very great in future and every opportunity should be taken now to anticipate such requirements. The utmost care should be taken of the existing forest resources and replanting should be carried out where forest is the most suitable form of cover and of crop. Other aspects of development which lie outside agriculture but which will play an important part in the future will be tourism and the tapping of the hydro-electric energy of the rivers. The latter might well be associated with irrigation development, for despite the precipitous nature of much of the area, there are many opportunities for small irrigation schemes.

250. There is no doubt, however, that the major problem in the whole region is demographic. The present numbers are maintained, even though the living standards are low, only because it is still possible to exploit the diminishing capital of natural resources, but this cannot go on indefinitely. Over and above the proposed development and better land use, therefore, the migration of part of the population to development areas down in the plains may be necessary.

251. Any development programme will be costly in terms of funds and personnel and the return will be meagre, particularly in early years. For this reason, there may be a temptation to delay action in such areas and to tackle schemes which give more immediate benefit. The longer action is delayed, however, the greater will be difficulties; the present flooding and siltation problems are themselves of sufficient magnitude to warrant early action. Emergency measures in the plains cannot solve these problems and will, in the long run, cost more than a bold approach to high catchment protection. The measures needed will require specialist staffs, because the techniques, the crops, the livestock, etc., available in the plains are not suitable for mountain conditions. An early need is for a

1. For a detailed programme see Murree Hill Commission Report.

resource and land use survey which would analyse the present situation and suggest measures for improvement. A start has been made by WAPDA in the Mangla Dam Catchment Survey and an extension of this work should be considered.

252. Much of the hill catchment area of the Indus river complex lies outside Pakistan's control, but this is no reason for delaying work in the area under Pakistan's jurisdiction.

Areas and Subjects Regulating Special Consideration

Riverine Lands

253. There are large areas of land along the banks of the main rivers in West Pakistan, particularly the Indus, Jhelum and Chenab, which are under water during the flood season. When the floods recede these lands are left with a rich covering of silt and are naturally full of moisture. Use can be made of this fertility and moisture to grow heavy crops of wheat and barley. Requisites for production are quick ploughing, cultivating and sowing as soon as possible after the floods recede so that full use can be made of the moisture in the top soil and of the high water table. Some of these areas are at present being cultivated but many remain unused.

254. A first step towards fuller use of these lands would be a detailed survey of all such areas to assess their extent, their suitability for development and their present usage. Ownership would also have to be determined as the best pattern of development would be to a considerable extent influenced by farm size.

255. The essentials of efficient cropping appear to be rapid and thorough cultivation and seeding at the beginning of the season and deep ploughing after harvest to bury the weed growth and seeds. The first is necessary in order to make full use of the water available to bring the crops to maturity and the second to control the weed growth which can be extremely rapid during the flood season. Such quick and heavy cultivation operations cannot be satisfactorily carried out by bullock drawn implements; tractors and heavy equipment are necessary. Large landowners

may be able to obtain their own heavy equipment but development by smaller owners would probably be dependent upon the setting up of an organisation which could hire out and service suitable implements and tractors.

256. Should the suggested survey reveal the existence of considerable areas of suitable land then the setting up of pilot schemes to investigate such matters as suitable crops and varieties of crops, methods of cultivation and water control should be considered. Similar investigations of the riverine lands of East Pakistan would show the way to their better utilisation.

Haor Areas of East Pakistan

257. There are large areas of low lying land which during the kharif season are so deeply flooded that no crops can be grown. During the winter season when there is no rain most of the land dries out so quickly that no cropping is possible without irrigation. It is estimated that these haor areas are some 2,000,000 acres in extent. They lie in the sub-division of Netrokona and Kishorganj in the Mymensingh district, in Sunamganj and Habiganj in Sylhet and in the Brahmanbaria in Tippera.

258. At present their use during the winter season is confined to rough grazing, to the cutting of fodder for use elsewhere and to the growing of patches of boro rice wherever irrigation water can be provided. Irrigation is usually by means of indigenous methods of water lifts but recently a number of power pumps of varying size, some of which can be mounted on pontoons, have been introduced with considerable success. Excellent rice crops have been grown but, so far only the fringes of the areas have been touched.

259. The land is nearly all privately owned by farmers who in the past, before the floods became so severe, were able in many areas to get a good crop of broadcast aman rice. The recent increase in depth of flooding is ascribed to the denudation of the catchment areas, to the shifting of the river beds and to the blocking of the natural drainage channels by the

building of roads and railways with inadequate bridge outlets for flood water. Farmers usually live on higher land which they crop during the kharif season and only move into the haor with their livestock when the floods subside.

260. Food production could be greatly increased by the supply of large numbers of power pumps to farmers or groups of farmers, but such farmers should at the same time be given technical assistance and guidance in the laying out and construction of their irrigation channels.

261. An overall assessment of the production possibilities of the area should be made. This should include an estimate of the areas which can be dealt with by small or medium sized power pumps and those which would require larger pumps and more elaborately designed irrigation schemes to reach them. There may also be areas more remote from water channels which could best be dealt with by cutting canals from one water channel to another. The effect of the heavy floods on any structures would of course have to be carefully studied.

262. Consideration should be given to the setting up of a special organisation to conduct pilot schemes to guide and control farmers in laying down irrigation schemes and cropping system and to supply [illegible] and service pumps. Such an organisation could also provide heavy equipment for levelling, or making banks and channels and for the initial breaking up of the soil and could assist by seeing that these operations were competently carried out.

Polder Areas of East Pakistan

263. Large areas of low lying lands along the Bay of Bengal were in the past protected from the sea by the building of banks to keep out the salt water. Until 1947 these banks were maintained by the large landowners, mostly Hindu, who have since left the country. The banks were then allowed to fall into a state of disrepair, sea water overran large tracts of land and made them unfit for cultivation.

264. Work is at present being undertaken to repair and extend the

banks to protect the lost land and to recover large additional areas. This work is being planned and supervised by WAPDA.

265. Protected land will have the salt washed out by the heavy summer rains and with the provision of additional water for flushing and should rapidly become suitable for cropping again. The additional water for flushing will be made available by the building of dams in the rivers. When the polders with their water control gates have been completed and are in working order, some agricultural organisation should be set up to take over their maintenance and operation with the help of farmers. Such an organisation could also assist in introducing improved cropping patterns

Chittagong Hill Tracts of East Pakistan

266. This area and its present uses and state of development has been described in the previous chapter. It is as yet thinly populated and undeveloped but has rich resources in the form of timber and bamboo. It has also a fertile soil and a climate suited for the growing of fruits, vegetables and other crops. The irregular topography with its ridges of steep-sided hills presents very special problems and careful planning and control will be necessary if soil erosion is to be avoided when extensive development takes place. A pre-requisite to building up extensive agricultural production is the provision of good communications and markets.

267. It is considered that the potentialities of the area justify a detailed survey of its resources and needs and the setting up of a number of pilot agricultural schemes. Special attention would have to be paid in planning to the finding of a permanent and settled system of cultivation to replace the present widely practised shifting cultivation known as Jhuming which is already causing considerable erosion.

Expansion of the Tea Area

268. Tea is in increasing demand locally as well as earning considerable foreign exchange. Everything possible, therefore, should be done to encourage its planting in suitable areas. A first step

is the planting up of all suitable land on existing tea estates, where much of the land is now given over to the growing of food, bamboos, etc. for the labour employed. It might be more profitable to bring in food and building materials from elsewhere and use the land of the estates exclusively for tea growing. This change would require discussion with experienced tea planters in the area.

269. Surveys should be made of potentially suitable areas in the Sylhet and Chittagong districts and also in other likely parts of both wings. Where suitable sites are found, planters should be encouraged to settle and develop them. Publicity is already being given to a scheme to encourage new planting by giving remission of rents and taxes during the development periods.

Fuel and Timber Reserves in Cultivated Areas

270. In all intensively cultivated areas there is an increasing shortage of wood for fuel and of timber for the making of implements and the construction of buildings. The only alternative fuel in most places is cow dung and the burning of this instead of its application as manure to crops, leads to reduced yields. Timber can only be brought in from outside at considerably higher cost.

271. Consideration must therefore be given to the planting of fuel and timber trees. In most districts there are patches of land which for various reasons, such as excess of water, poor soil or low fertility do not give satisfactory crop yields. Many of these could be planted with suitable trees and give profitable returns. In new colonisation areas particularly, it is suggested that small blocks of sav four or five acres be set aside for the tree planting in village areas to meet local demands.

272. The planting of trees along canal banks, roads and railways should be encouraged as should planting around homesteads and villages. Such trees would supply both shade and dry season lopping for fodder. The growing of these could probably best be stimulated by the provision of a well stocked nursery of suitable types of seedlings in each union,

combined with propaganda on the value of trees and some instruction on the best methods of establishing and growing them.

273. The setting up of plywood and matchwood factories has led to the rather indiscriminate cutting down of trees in surrounding areas. Wherever such industries are established, provision should be made for the carrying out of a campaign for replanting with the best species. Seedling trees and instructions on recommended methods should be made readily available.

Fisheries

274. There are good possibilities of very substantially increasing the supplies of fish both from inland and marine fisheries. Such increases would result in a much improved and better balanced diet for the masses of the people and in a possible surplus for export of some of the more valuable species of fish.

275. At present the development of the marine fisheries is the responsibility of the Central Government and that of the inland fisheries of the provincial governments, but there appears to be a certain amount of overlapping of effort in both the research and development aspects of this industry. Consideration should be given to the closer coordination of the work of all concerned.

Marine Fisheries

276. Marine fisheries have until recently been very largely neglected and little has been done to develop the industry. During the last decade, however, interest has quickened and investigations have shown that the seas off the coast of West Pakistan abound in fish which could be harvested in quantity if modern vessels with suitable equipment were used.

277. A start has been made by government in building boats and in supplying suitable diesel engines and nylon nets to local fisherman or groups of fishermen on easy terms. Catches with power boats and better equipment have been good, and more and more interest is being shown. It would appear that there is justification for a considerable increase in

the assistance being given.

278. An up-to-date fishing harbour has been built at Karachi together with a fish market and cold storage facilities. Unfortunately, in the western province outside Karachi there are few suitable harbours where fish can be landed in the vicinity of large markets. If the industry is to develop attention will have to be given to improving harbours and making refrigerated transport and storage available. This would ensure that catches are marketed to the best advantage of both the fishermen and the public. The possibilities of improved curing and of canning near the point of landing should also be examined.

279. Off East Pakistan in the Bay of Bengal little is as yet known of the fishing grounds but one or two small scale trials with modern vessels have indicated very good prospects. What is now required is a complete all the year round survey on the results of which future expansion could be based. If the results of a survey were satisfactory, government help would be needed to assist in providing modern boats and fishing equipment and also adequate harbour, storage and marketing facilities.

Inland Fisheries

280. In East Pakistan these are of great importance and fish from ponds, beels and waterways, as well as from rice fields are a valuable item of food. In recent years many of the tanks or ponds have been neglected and some have gone out of production. In the West wing there are fewer ponds and waterways but considerable interest is being shown and the dams now being built will increase potentialities.

281. Steps which could be taken to increase production include a vigorous campaign to clean and, if necessary, deepen ponds which are choked by weeds or silted up, and the establishment of fish hatcheries in every district (at least in East Pakistan) from which ponds and other closed waters could be regularly stocked. Private individuals could be encouraged to run these on a commercial basis after government had shown the way. In open waterways some stocking should also be done. Regulations

concerning the protection and conservation of fisheries should be more strictly enforced in all areas otherwise long term policies will be rendered ineffective.

282. The present system of letting, to the highest bidder, of reconditioned closed water fisheries and of open water fisheries in East Pakistan should be carefully examined to determine its effects on the fisheries themselves and on the supply of reasonably priced fish to the public. At present rich middlemen appear to be the chief beneficiaries and government might be wise to consider the advantages of letting, at lower rents, to local fishermen's cooperatives under clearly defined conditions which would ensure maintenance and good management.

283. Much of the catch from the larger fisheries cannot be utilised to the best advantage because of the lack of rapid transport to the markets and of efficient storage or curing and preserving facilities. These deficiencies will have to be supplied if the industry is to develop rapidly and along the most profitable lines. At the same time there is need for organised marketing to ensure that fisherman gets a fair share of the price paid by the consumer.

Poultry

284. Poultry provides a large potential source of protien food at a reasonable cost and one which is capable of being very rapidly expanded. There is a very large and ever-growing demand both for eggs and table birds in the large population centres.

285. The present estimated population of poultry is about 30,000,000 birds - 25,000,000 fowls and 5,000,000 ducks. About three-quarters of the fowls and nearly all the ducks are in East Pakistan. Laying birds are estimated at around 10,000,000, that is one layer to every eight people. As the average production per 'Desi' layer is between 40 and 80 eggs per year, and 90 per cent of the layer are 'Desi', it will be seen that the average egg consumption per person must be extremely small, around seven eggs per year. In the larger cities it is known that consumption

varies from 20 to 50 which means that very few are consumed in the other areas.

286. At present most fowls are kept in small flocks of under ten birds as a side line by cultivators. These birds receive very little attention in the way of food, housing or management. They are usually left to find their own food as best as they can and consequently lay relatively few eggs. There is a number of larger flocks where feeding and management are more scientifically carried out, but such establishments encounter many difficulties, the most important of which are the absence of balanced food supplies and sometimes the lack of protection against the common diseases.

287. All the necessary ingredients to make up a balanced ration for chicks, growers and layers would appear to be available locally though some of them require processing before use. A difficulty is that prices are high as human beings and poultry compete directly for some of the basic ingredients of any ration. This problem can only be overcome by raising crop yields (by the use of the "five firsts") and perhaps the grow ing of more coarse grains especially for poultry feeding. Much greater use could also be made of by-products, at present not fully utilised, in making up rations. Government should interest itself in the provision of poultry food supplies, either directly or preferably by encouraging commercial interests to enter the business. In the latter case standards would have to be laid down and legally enforced to safeguard the poultry farmer.

288. There is a number of well known diseases which cause very heavy losses and discourage the development of the industry. Most of these can be prevented or controlled by the use of biologicals, if systematic prophylactic treatment is organised. While there is need for much further research and large scale trials in methods of control the outstanding needs at present are for a guaranteed (both qualitatively and quantitatively supply of vaccines and medicines and for the necessary trained staff to administer them or teach their administration. In the early stages

government will have to undertake the production and distribution of these supplies but later this might be taken up by commercial concerns.

289. When these difficulties have been overcome commercial eggs or table bird production would present attractive possibilities and provided efficient management were given should be profitable to anyone investing capital and managerial skills. At a later stage the introduction of a broiler industry might be considered, but this could only be done if adequate supplies of hatching eggs or day old chicks were available unless the broiler enterprise were prepared to undertake the whole range of operations from breeding and laying flocks and hatcheries to the dressed table bird.

290. In recent years birds of a number of improved breeds have been distributed to farmers and others from government poultry farms. Little evidence is available as to the value of such birds in small farm flocks where they are left to fend for themselves, though they are undoubtedly popular and their egg production, where they survive, considerably higher than that of 'Desi' birds. Their greatest value meantime would appear to be in larger flocks where proper feeding and management are given. Under such conditions they are more profitable than local breeds and give a much better return for the food and labour expended. Comparison between selected local birds and imported breeds should be made under farm conditions where some attention and a little extra feeding is given.

291. Any large increase in the keeping of poultry by small farmers would necessitate the setting up or control of an organisation for collecting and marketing to ensure that farmers receive a fair price and that eggs found their way to the consumer as quickly as possible. Large poultry farmers would no doubt be able to make their own contracts and marketing arrangements.

Conclusion

292. Certain main features stand out from this long analysis of the techniques for increasing production and in closing the chapter it is important to recollect them.

293. It is desirable to repeat that it is the first two headings concerned with the "Existing Cultivated Areas" and "New Colonisation Areas", which cover the vast bulk of the population and form the heart of the problem. The remaining headings, the "Range Lands", "Hill Catchment Areas" and "Areas and Subjects Requiring Special Consideration" share many of the same organisational needs but additionally have particular organisational problems of their own.

294. It is desirable to repeat also that the natural resources of the whole country in terms of climate, soils and water are generally favourable. In no sense is the prospect limited, as in some other countries, by the sterility of natural conditions or by the fact that these have been fully exploited already. Indeed, in Pakistan conditions, the very fact that present yields are so low awakens the hope of expansion to far higher levels and it is reasonable to believe that if the various techniques suggested in this chapter could be adopted, and the various disabling factors removed, the country could look forward to a doubled and possibly trebled yields of its main products. In such circumstances the sombre picture of the farmer's present condition revealed in chapter 4 could be transformed.

295. But to affect this transformation presents very formidable difficulties. In this respect the situation in Pakistan is immensely different from those easier conditions enjoyed by many developed countries in the process of their "take off" to prosperity. In the vast virgin plains of North and South America, in Australia, New Zealand and analogous countries, prosperity often began with the simple access by road, rail or canal to empty regions with fertile land and reasonably good rainfall. The development and management of agriculture could in their case be left to the enterprising individual. There was plenty of elbow room. Moreover at such times in such countries there was no national reason to worry about individual success or failure. Similarly Europe, with its slow evolution of agriculture and industry over many years with little population pressure, forms no adequate parallel. The situation in Pakistan today presents a

complete contrast. There is no empty region naturally well-endowed into which adventurous individuals can pour. There are, with the exception of natural gas, no visible natural resources to form a basis for industrial development. The main key to the future lies in man-made irrigation, and a depressingly high part of the cost involved is merely to replace depreciation for water lost to India or land lost to salinity. There is no elbow room enabling individual initiative. On the contrary vast numbers of small holdings must for many purposes be merged together for management. Finally the population pressure imposes a great national urgency on agricultural development and a vital national interest in individual success or failure. The implication of these facts is that a far greater degree of national organisation for development is necessary than has often been the case in the so-called Western world.

296. The outline of this chapter has accordingly been designed to set out the techniques for improving production according to the increasing intensity of organisation in which they need, and because implementation is now a paramount priority. The minimum need is represented by the "five firsts", applied without having to change the present patterns of land usage. Even at that stage considerable organisational ability and supervision are involved in the supplying of good seed, fertilizer, plant protection and short and medium term credit, together with the necessary stores and offices near enough to farmers.

297. The intensity of organisational need increases considerably as soon as development passes on to making changes in present patterns of land use. The introduction of consolidation, mixed farming, mechanisation and, above all, irrigation demands a very high degree of coordinated planning of engineering and agriculture with considerable supervision of the subsequent farming, if the maximum yields which the nation requires are to be attained.

298. The greatest intensity of organisational need occurs first in new colonisation areas, if the objective is pursued there of creating high

income peasant communities by assisting the farmer from bottom to top to ensure maximum yield and maximum price benefits. For there the virgin land offers the easiest starting point for planning the various operations as integrated parts of one vertical structure. Levelling, rectangulated lay out of water courses, organised preparations of the land by machinery, standard farm units, rotations planned in block pattern, application of the "five firsts", common marketing and processing at cost without intervention of middlemen, and competent management of the whole combination can immensely strengthen the position of all the farmers, while leaving the individual to retain his own return according to his own products. Demonstrated at first on virgin lands, such patterns could later be applied to existing cultivated areas. Peasant proprietor holdings could be reorganised to suit such a combination while larger landowners, subject to suitable regulations in the tenure conditions, could introduce such patterns for their tenants with private enterprise capital.

299. While this ultimate objective demands an exceptional degree of organisational planning and managerial ability, a prominent feature at the start of the whole process of introducing new techniques is the high degree of research, surveys and pilot scheme which must precede it. Although the benefits of these techniques are known in general, the conditions of their application in a local environment are often unknown. The value of better seed depends on the discovery of varieties suitable to the locality and to the techniques intended to be used. The value of fertilizer depends on soil survey and extensive field trials for appropriate combinations, and that of plant protection insecticides on accurate study of pest cycles and experiments to determine the most economical treatment. The introduction of mixed farming and irrigation demands knowledge of crops best suited to the locality and the best water duties and rotations for the soils concerned. Similar considerations apply to salinity control with the additional need to discover the best method of drainage, while the introduction of machinery requires extensive testing not only of the best

tractors and implements, but of the economic advantages and displacement disadvantages.

300. The need for pilot projects applies not merely to discovery of the appropriate techniques but to the problem of getting the local farming population accustomed to the changes involved. Securing their cooperation is as important a research field as the discovery of the appropriate techniques themselves, and pilot projects demonstrating the benefits of these techniques must be distributed widely before their general application in any particular area. Research and pilot schemes, both scientific and human, thus form an essential part of a satisfactory organisation for development.

301 The key position held by credit in the circumstances of Pakistan development gives an added impetus to organisational need. Personal private capital is rarely available and the poverty of the majority implies a need for short and medium term credit, the only security for which is the potential improvement of the crops. These circumstances involve a serious risk of uneconomic results unless strict supervision of the farming is provided, and of the satisfactory repayment of the loans even though they may be given in kind. Properly managed stores and offices and sufficient extension staff are an indispensable investment to the efficient use of such credit.

302. Long term credit is more linked to those techniques which apply to changes in the present patterns of land usage, such as machine levelling, drainage and tubewells. It is probable that for the poorer majority such development will have to be undertaken by government which increases the organisational need. The position is easier in the richer section of society where landowners can obtain credit for needs of this kind against land mortgage, although even here the risk of diversion of such loans to trading and other purposes makes supervision important in the national interest.

303 Apart from the increase in yield which these techniques are

designed to assist, increase in the farmer's income is part of the objective and is itself an accessory factor for increasing production. One prominent method of enhancing farmer's incomes is the organisation of joint marketing arrangements to assist the farmers' bargaining position vis-a-vis middlemen and merchants. Such marketing arrangements can also play an important part in ameliorating the problem of security for credit. Provision of suitable warehouses at market towns and at lower levels, reliable management of these warehouses and above all, businesslike handling of the marketing are essential to success in this part of the objective and once again demand high standards of organisation and managerial capacity.

304. It is appropriate at this point to mention an additional aspect of the problem. Fear that a fall in price may follow a rise in production has often operated as a psychological disincentive to farmers and may affect their readiness to adopt the recommended techniques. Consideration must, therefore, be given to the question whether economic conditions in general are working in favour of or contrary to the interest of the farmer. To encourage increased production prices must be reasonably remunerative. Sometimes, however, public policy may take the direction of favouring the consumer section of society in order to keep down the cost of living and of doing this at the expense of the producer section. Sometimes also interference to fix the price of one commodity may result in a distortion of the price relationship among the several farm commodities and thereby bring about distorted production pattern which may not always be in the best interest of the nation. Even subsidies for agriculture may not always accomplish their objectives and may also result in distorted production patterns. Examination has to be made as to how influences of this kind in the general economic situation are affecting the farming sector, and as to what correctives may be needed if the results are adverse. In this context special attention needs to be given to the price relationships that have developed between farm and non-farm products in order to

determine whether the terms of trade may not be operating adversely to the interests of agricultural production.

305. As a final generalisation, the application of improved techniques for increasing production falls into two main branches of action. On the one hand the government itself must create an environment in which the farmer can use them. This is partly a matter of removing obstacles like salinity, waterlogging and flooding, and like unsatisfactory land tenure conditions and fragmentation, and partly a matter of providing new facilities like irrigation where it has never been available or improved water supplies in existing irrigated areas. It may also be a matter of government taking a positive policy concerning price relationships and the general economic environment in which the farmer operates.

306. On the other hand the farmer must play his part. This requires at base a changed national attitude to land, less of an acknowledgement of rights and more of an insistence on duties. It also requires a readiness to accept major changes and make a fresh start after adjusting farming patterns to a satisfactory permanent basis. It means a willingness to consolidate land and to form associations for joint systems of rotation, lay-out and managerial services. These are not easy changes to effect in an environment of conservatism, poverty and vested interests. To get the necessary techniques applied to and adopted by farmers will require a thoroughly, efficient organisation devoted, especially to this objective over a long period of time and particularly able to bring the various factors to bear in a planned coordinated manner. The ambitions of thousands of farmers, tenants and landowners, must be fired to discard old ways leading to a dead-end and to take instead the road to prosperity which modern techniques, and the new patterns which they demand, now offer. For this, above all, bold practical plans must be preferred. Marginal changes involving little improvements will never attract the needed enthusiasm. Whether the present attitudes in the country and the present government services match up to these requirements is the subject of the next chapter.

CHAPTER 6

THE TOOLS FOR THE JOB

Introduction

1. In the first part of the report we explained the national need for increased agricultural production. We then examined the position of the farme on whom ultimately such increased production entirely depends, and found a somewhat sombre and discouraging state of affairs. We next considered the techniques which were needed to increase production and concluded that if these were applied there was no reason why substantial increases in productio should not be obtained. It appeared to us, however, that the satisfactory appli cation of these techniques was no easy affair. The situation demanded on the one hand the removal of certain disabilities affecting production adversely and on the other the satisfactory supply of a number of services to farmers together with their cooperation in using them. A most important feature was the interlocking nature of these techniques and services which for full success must be presented to and used by the farmer as a package deal. What was wanted was an organisation capable of carrying out the interlocking actions and of persevering until the project objectives were attained. The steps which might be taken in different parts of the country were outlined according to the degree of organisational need demanded and it was clear that this would vary in intensity with the objective and project concerned, the simplest being the 'five firsts', the most complicated the complete vertical structure.

2. We have now to assess whether the present government machinery is a suitable tool for the job outlined and whether the environment in which it operates is conducive to a successful outcome. We appreciate that changes are being proposed and made in the present government machinery which may alter the position in future, but our assessment can only be based on views which we have formed in the course of our enquiry.

3. In this chapter we comment first on certain attitudes in the country as a whole which effect the environment of agriculture. We then examine the organisation of the departments mainly concerned with agriculture and describe certain difficulties and deficiencies which we have come across

particularly at the district level. We go on to consider the District Team method for handling development. We then touch on some general considerations about government services which seriously affect the ability of any organisation to carry out an action programme of the nature needed. Finally we make proposals for an Agricultural Development Corporation in each province. The chapter therefore deals with the following:

a) Attitudes.

b) Departments Handling Agricultural Development.

c) The District Team Approach.

d) Some General Considerations about Government Services.

e) Agricultural Development Corporations.

Attitudes

4. It is essential to appreciate how very recent is the sense of any urgency for increased agricultural production and how limited this still is to the top level of government officials. In putting emphasis on such a matter all government officers have to overcome attitudes arising from years of neglect, and in part contempt, of agriculture. We have mentioned in Part I how, after the creation of Pakistan, preoccupation with other vital matters and the need for industrialisation tended to thrust agriculture into the background until the food shortages of recent years have brought it into prominence. But these attitudes are more deep seated and date back to earlier years.

5. It is easy to forget that before the creation of Pakistan the major modern means of achieving high yields (fertiliser, plant protection, mechanisation, and the general application of scientific discovery to agriculture) were available in the world in general on a much more limited scale than they are today, and that in primary producing countries the use of such aids hardly paid in view of the low level of prices prevailing before World War II. In such circumstances there was little reason to suppose that anything was much better than customary traditional methods of agriculture. Fallow was the cheapest fertiliser, and a policy of leaving farming to the farmer except for some improvement in seed and stock suited the circumstances. In West Pakistan, in the old colonies of the Punjab, the general principle was to avoid

government interference and overheads, and to let the settler level and develop his land cheaply in his own time and manner. This principle was continued in the new irrigation schemes started after the creation of Pakistan and the main emphasis in agricultural development was on the purely engineering side of building new barrages and canals. In East Pakistan similarly the traditional way of farming was left to continue with little thought to change it.

6. The public attitude to agriculture has been in tune with these circumstances. The businessman has seen no gain in investing in agricultural production and has confined his attention to the quicker and safer returns of processing and handling the farmer's products. With few exceptions, landlords and new investors in land have given little leadership by way of management. They have been content to draw their rents for consumption, or investment in other business, and have seldom ploughed capital back into productive land development. The farmer himself has come to be looked down on as an illiterate of little importance to the country's economy. Living at a mere subsistence level his resultant apathy has become identified with idleness, while his inability to take any risks has increased his conservatism and developed an attitude of complete dependence on government for any innovating action.

7. Because of the attitude of general complacency towards agriculture government did not in the past provide aid and funds to meet the needs of agriculture and the resultant poor status of the farmer has depressed the statu of everything to do with agriculture. In the political field the more vocal urban and upper classes attracted prior consideration and former political leaders, with a few notable exceptions, were reluctant to accept a portfolio so unimportant as agriculture in the public esteem. In the field of education, the purpose of being educated was to escape from being an illiterate person into a white collar job. In the curriculum agriculture hardly mattered and as a career offered neither power nor prestige. Students placed it at the bottom of the list of their ambitions with the result that by adverse selection the quality of the personnel entering the agricultural departments was, with exceptions of course, generally of a lower level than that of other services. The low status

has affected in turn the standing of the department of agriculture both among farmers and in the important competitive battle for a share of the country's scarce finance. As will be seen shortly when more detailed description of the department is given, the numbers, pay and facilities accorded to the staff, from research at one end to a nebulous extension service at the other, have suffered great disadvantages from this reputation for unimportance.

8. Another disastrous effect has been, that while the more developed world has been giving increasing weight to the contribution of technical men in policy formulation and derived great benefit therefrom, the poor status of agriculture in Pakistan has not inclined those responsible for determining policies, and particularly those actually allocating funds, to accord much esteem to technical advice or to appreciate that, if agriculture is a serious subject, considerable investment of money is quite inevitable to transmute it from years of neglect to years of prosperity.

9. Against this background the menace of increasing population and static yields has somewhat suddenly thrown a cloud over the future just when the revolution of rising expectations is demanding a higher, not a lower, standard of living, and the combination has thrust agriculture into the limelight like an unprepared actor. The result has been a very marked switch of attention by national leaders to the priority importance of agriculture and this has been reflected in the Second Five-Year Plan. An urgent demand for self-sufficiency in food has rapidly come to the fore as the first objective, but there has not been much time to change in planning from mere recommendation of a number of individual schemes to the kind of long-term approach to the whole problem which we have attempted to picture in this report, and the attitudes of the past still prevail over wide ranges of officialdom and of the public.

10. Emphasis on the subject is at last there but emphasis on the tools to do the job is still missing. The comparative absence of any commercial sector to service agriculture has thrown almost the whole responsibility upon government departments. Suddenly confronted with this new and vital need without much time to devise any new machinery to meet it, the relevant departments

have had to compete in attempting to handle agricultural development in addition to their past routine jobs and with all the disadvantages of past neglect. The country cannot afford any misplaced confidence in the outcome of a matter so vital to it, and an assessment of what is happening in the departments in these circumstances is necessary.

Departments Handling Agricultural Development

11. In assessing the departments dealing with agriculture, one must judge whether, under their guidance, farmers are likely to adopt quickly the techniques already outlined. The assessment begins with the state of affairs at the farmer's level. Although other departments also impinge upon the farmer and have important effects on his production, the assessment here is confined to the following departments which make the major impact:

1) Agriculture including Research
2) Animal Husbandry
3) Irrigation and Water & Power Development Authority
4) Cooperation
5) Agricultural Credit Institutions
6) Village-Agricultural Industrial Development
7) National Development Organisation & Basic Democracies
8) Revenue & General Administration.

Department of Agriculture

12. The Department of Agriculture typically reflects the patchwork way in which the sudden call for increased production has had to be faced. Operating under all the handicaps of a minor provincial service starved of funds and low in public esteem, its original purpose was that of a very attenuated advisory service confined mostly to demonstration to rural leaders and larger landowners. In no sense was it an action department equipped to account urgently for something being done. With research facilities of a negligible nature in East Pakistan and seriously impaired (including the complete destruction of records and library at Lyallpur) in West Pakistan; a paucity of training institutes; inability to attract good youngsters; and a totally inadequate personnel in the front line, it has nevertheless been the natural first medium to turn to for handling the increasingly complicated claims of development. It has been called upon to expand extension and demonstration services, to open and manage new seed farms, to organise a vastly increased supply of

fertilisers and better seeds and develop the completely new subject of plant protection. It has had to open an engineering wing to operate tractors and bulldozers for cultivation and land clearance and to sink tube wells and operate power pumps. While the achievement has been notable when the department's circumstances are taken into account, it inevitably falls far short of the needs outlined in earlier chapters, and as an instrument for development it has very many defects.

13. For the vital front line the two officers directly in touch with the farmer are in East Pakistan, the Union Agricultural Assistant and above him the Thana Agricultural Officer, and in West Pakistan, the Field Assistant (Mukaddam) and above him the Agricultural Assistant. Posts, above this level, tend to cover too big an area and to be too weighed down with administration to enable more than an occasional contact with the village level. A great deal therefore depends on the quality and capacity of those in these front line posts.

14. Farmers in the cultivated areas of Pakistan live mostly in villages and although these of course vary in size, it is customary for the purposes of extension to consider an average village as containing about 1000 people all told, or about 150 farming families, the remainder having other occupations. These are the people at bottom who have to be persuaded to improve their techniques of production. In East Pakistan the unit next above a village is called a Union which is held on an average to contain 10 villages, or say 1,500 farming families. The Union in East Pakistan is the lowest rung of the agricultural department's extension ladder. Its Union Assistant is thus a keyman supposedly able, by knowledge, personality and the provision of the services which he can supply, to influence a manageable proportion of the farming community. The approximate area which he has to look after would cover about 5000 acres but this in East Pakistan would be split up into many tiny holdings.

15. In reality, the prospect of getting a good job done at the Union level in East Pakistan is not high. Out of 4,000 Union Assistants, only 1,700 have had a year's training in agriculture while 2,300 were simply transferred from

the jute regulatory service when it came to an end. Even if the men were better trained, the facilities to do a good job are almost non-existent. Low in status and pay, with no office and no transport and a purely nominal housing allowance, many of the Union Assistants cannot afford to bring their families with them and frequently live away from the Union in which they are supposed to work. Others supplement their income by teaching or have to lodge with some important farmer and in return give him most of their attention. It is difficult for their attention in any case to go beyond mere demonstrations for they are seldom in a position to supply the aids in seed, fertiliser, improved implements and insecticides which they recommend. Few Unions have any stores of their own. The nearest are at the Thana which may be as many as 20 miles from the farmer's door.

16. At the nearest level above the Union Assistant in East Pakistan comes the Thana Agricultural Officer. This post is meant to be filled by a graduate in agriculture but owing to the small number of these yet available, the majority are promoted Union Assistants. As the Thana covers approximately 10 Unions his sphere of activity is over about 15,000 farmers or 50,000 acres. For this purpose he is given a bicycle. The intention is to provide housing, office and store at the Thana level and in certain cases this has been done. As the Thana headquarters are usually in a market town, housing, office and store can meantime usually be hired but seldom at the official rates provided.

17. Weak as is the front line position in East Pakistan, it is worse in West Pakistan. Here, until this year, there has been no such thing as a Union and the bottom rung of the extension ladder begins higher up. This bottom man the Field Assistant. is supposed to cover roughly the same number of farmers 15,000, as the Thana Agricultural Officer does in East Pakistan although the area they farm in his case averages nearer 100,000 than 50,000 acres. For this purpose, like his opposite number the Union Assistant, he is given no housing, office or transport facility. In education he is much the same as the trained Union Assistant, those in the Punjab having had a year's training in agriculture and those in Sind frequently lacking even this training.

18. In West Pakistan, above every two Field Assistants comes an Agricultural Assistant. He is roughly equivalent to the Thana Agricultural Officer in East Pakistan, although he covers double the number of farmers (30,000) and some 200,000 instead of 50,000 acres. He is usually better trained, being in most cases an agricultural graduate. He is provided with office accommodation but no housing, and no transport to cover his vast area, although a beginning is now being made to supply him with a motor bicycle. Travelling allowances for all these men are so small that effective work can be undertaken only for three months in a year. Sometimes in East Pakistan the daily allowance does not cover the hire of a boat, the only means of getting around, while in West Pakistan there is no provision for the cost of taking a bicycle by train or using a bus within 20 miles of his base.

19. These then are the front line staff upon whom the nation depends for its vital contact with farmers; in East Pakistan it approaches in numbers the minimum requirement for such work but it lacks the knowledge and the facilities to do the job; in West Pakistan the staff is too small to make any impact, and, although more knowledgeable, is equally without the facilities to make any real contact with the farmers. At the most they can be little more than demonstrators and for a cadre required to inspire an agricultural revolution, the enthusiasm of the majority of them is further tempered by the knowledge that they have little hope of promotion to senior posts because of their lack of professional qualifications.

20. In such circumstances it is not surprising that almost universally in our tours in the country farmers complained that they never saw the agricultural extension staff or when they saw them had no great confidence in their ability to be of much service. In point of fact, quite apart from their insufficient numbers, inadequate knowledge and poor status in terms of pay and facilities, their ability to be of service, even for the five firsts, is depende. on the availability of good quality fertiliser, seed and plant protection mater in stores near enough to the farmer to induce him to use them. It is also dependent on the existence of an effective supply line to such stores which

free the front line men to spend their days where they ought to - in the farmers' fields. At present neither of these conditions exists.

21. The quality of the storage almost everywhere leaves a great deal to be desired and some description of the godowns observed at Thana level in East Pakistan is relevant. In a typical example one godown held seed wisely raised on a bamboo platform but overrun with rats. In another, bags of sulphate of ammonia were lying on the earthen floor, many had burst and much of the fertiliser was caked hard. Sides, roof and floor could not have kept out rain. In yet another, sulphate of ammonia was stored in a large leaky roofed disused cinema. It was said to be five years old stock transferred from some district which had over-estimated its requirements. Most of the bags had burst and the fertiliser had caked hard. In one store, phosphate lay in a heap with no semblance of bags; in another a large consignment of sulphate of ammonia from Japan was in paper bags which had rotted. To take delivery, even when they came to the Thana headquarters, farmers would have had to provide their own bags. Such poor storage facilities may explain some of the failures in the field. They would be quite intolerable for urea, with its greater sensitivity to moisture, when that has to be used as the main source of nitrogen, upon the completion of the new factory at Fenchuganj in 1962. They also make it impossible to check stock accurately.

22. This description of the present difficulties becomes more important because, on the face of it, fertiliser application seems the easiest and quickest of all techniques to apply. It must be realised, however, that artificial fertiliser, as far as ordinary farmers are concerned, was practically unknown in East Pakistan only 5 years ago, but that the trend of the figures of use could become quite astronomical in terms of local resources. In a typical advanced Thana, the use of fertiliser has risen from 300 to 1,200 to 4,000 maunds in the last three years, and next year's target is set at 15,000 maunds (say 550 tons). This in itself will be an immense task considering the staff conditions described, but if a minimum of two maunds were applied to every acre, a Thana would need 100,000 maunds or 3,700 tons. To jump from 4,000 maunds to 4,000 tons per Thana means, in terms of handling facilities

and farmers offtake, an increase of 27 times. The difficulties of such an achievement in present circumstances must be realistically appreciated.

23. In West Pakistan. fertiliser has been used far more extensively than in East Pakistan particularly on high priced cash crops. It is usually stored by appointed distributors in private godowns of equally poor quality, but owing to low rainfall and better communications the condition of the godowns is of less consequence from the point of rain damage. The fact that private godowns have to be used does, however, bring up another matter of great importance. Government fertiliser supplies are forwarded to these godowns on consignment and the agents are required to pay at regular intervals for the quantities that they sell. Often a long interval goes by without payment, for the sums due are useful to the merchant as capital for other transactions Somebody then has to dun the merchant to pay, to check his stock to see what he ought to pay, and to watch that he does not adulterate or sell short weight bags. Nobody is provided for these supply line jobs and the responsibility for stores and stocks falls on the front line extension staff. In these circumstances, stores checking can be a very heavy burden and when, in addition, large numbers of reports and returns have to be sent in monthly to headquarters every excuse is provided for turning the field job into a desk job.

24. Behind the front line staff, there are, in East Pakistan, Sub-Divisional Agricultural Officers each in charge of about ten Thanas and above them an Assistant Director of Agriculture in charge of each District. In West Pakistan there is no sub-divisional post and the man in charge of the district is called an Extra Assistant Director of Agriculture. Above him in both provinces are Deputy Directors in charge of a number of districts. All these are fully qualified men equipped with transport.

25. Although in individual cases outstanding men have somehow left their mark on the area under their command, the general picture presented is of higher ranks well-staffed but unable to be as effective as they should be because of the gaps below them, already described. Other factors also affect their potential efficiency. The absence of any supply organisation means that

they get preoccupied with arrangements for receiving, forwarding and storage and their absorption in administration is increased by the absence of any authority to sanction expenditure of more than a nominal nature without reference to provincial headquarters. This makes it impossible for them to put right small matters which are holding up important aspects of production or even to adjust anomalies which are operating very unfairly on their subordinate staff.

26. The lack of decentralisation of authority over expenditure is so universal a problem that it will call for further comment in the later section on general considerations about government services. So also will another grave deficiency affecting the front line, namely the unpredictable delays in the ordering of supplies under the present centralised system. To this latter defect was attributed, almost universally in our tours of the country, the absence of fertiliser when it was wanted and its ultimate arrival too late. Since there is no organised supply line and storage facilities are grossly inadequate, and since farmers have no storage of their own, they must therefore put fertiliser on their land immediately on taking delivery. This defect in timely ordering adds to the risk of deterioration in stock and detracts from the confidence of the farmer in the front line staff.

27. The unfortunate effect of continuing to expect the present extension staff to handle supplies on the scale now needed for development, and with little decentralised authority, can be further appreciated by the present state of another of the 'five firsts', the supply of good quality seed. An illustration from one of the best districts in East Pakistan will convey some of the problems which are part of a general picture.

28. In theory, nucleus seed produced by a plant breeder is supplied to the district foundation farms from the research station in Dacca. There is no nucleus production area anywhere in East Pakistan except Dacca, but the Dacca nucleus area is itself tiny and very little new breeding work emerges. In theory, the nucleus seed is multiplied on the foundation farms. These farms are also the responsibility of the district and front line staff, who hav

no particular training in farm management or seed production. There were five of these in this district. (It must be remembered that four years ago there were no seed production farms anywhere in East Pakistan.) With the very real difficulty of getting any land without evicting current farmers some of the sites were very unsuitable both for production and for administration, and the total area was not related to any programme of supply to farmers. All farms were run with direct labour, not tenants, but some were badly equipped in threshing floors and stores, and some had not enough bullocks. There was no decentralisation of the budget to farm level. There were complaints that the budget funds were often allotted too late for the job to be done. Sanction had to be obtained for each item of expenditure even after the budget had been approved. No emergency expenditure of more than Rs. 50/- could be incurred without reference to Dacca.

29. After production on foundation farms, in theory all Thana Agricultural Officers submit indents for seed for their registered growers. These totalled only 1400 acres in the whole district, but usually the total production from the foundation farms was so low that the indents had to be scaled down. There were no enforceable contracts with the registered growers to sell back seed to the government for further distribution, and in the past year sanction to purchase from them came too late and the price allowed was too low to secure supplies. As the seed used on the foundation farms was seldom derived from new nucleus stock, and as the quality was sometimes not attractive to farmers any way, a price higher than the market price for ordinary seed made it difficult to sell.

30. Observations in one particular foundation farm showed in detail the extent of the problems. The land, previously in many individual small holdings, had not been levelled, although it was divided into sizeable working blocks. Its only tractor was out of commission from failure of the hydraulic system. The nearest mechanic, from whom no reply had been received for four months, was at Dacca. Both fertiliser and plant protection measures had been applied but the crop yields were no better than those of adjacent farmers.

31. The yields were poor for various reasons. The crop was sown late because labour became available only after the adjacent farmers had planted their own crops. There was no housing for any permanent labour, and even temporary labour could not be paid daily as was customary in the neighbourhood. Labour bills, made out fortnightly, had to be forwarded through the Assistant Director to the Deputy Director in Dacca for sanction, returned through the Assistant Director, who then drew the money from the treasury and sent it by money order through the post to the farm. The system usually took 1 1/2 months before payment. The approved rates for labour, instead of being variable according to current conditions, were fixed at Rs. 1-8-0 a day. As other farmers in the area supplemented wages with free meals as well at peak periods, and the government farm manager was not allowed to do this, the result was that on top of late sowing no weeding could be done.

32. The farm superintendent had been in the department for 19 years. He had an assistant and a clerk who slept in one room of the office as housing was only provided for the managers. Cowmen equally had no quarters. The staff complained that they had a total of Rs. 650/- due to them for travelling allowance which had not been paid for two, and in some cases for four years. The travelling expenses had been incurred in going to get supplies, or machinery spare parts, or to attend conferences. They submitted their travelling allowance bills monthly through their Assistant Director without apparent effect. Annual increments had also not been paid for two years. A final touch, conveying a picture of the indifference of redtape to morale, was that of a cowman who, on being congratulated on the fine condition of his bullocks, quite exceptional in the district, replied that he had not been paid his wages for two months and had himself an empty belly.

33. The situation in West Pakistan is considerably better but the efficiency of the result varies with different districts and certain main defects stand out. The production of nucleus seed from the plant breeder and his contact with the seed farms is on a negligible scale. The subsequent production of foundation seed from the farms is woefully small. Farm managers

are not specially trained to produce such seed nor kept on the job. Nor is there any uniformity of supervision over these vital farms. Some, instead of presenting the edifying spectacle of high yields produced by a combination of the 'five firsts', do not themselves, because of budgetary restrictions, use the fertiliser which the extension worker is supposed to be recommending to adjacent farmers. Yields of this precious supply of seed are often below that of adjacent farmers not only for the reasons stated but because some farms are operated on a tenancy system where, as usual in the system, the tenant plays down the yield to increase his share and no timely finance for buying his share or replacing it is available.

34. After the seed farms no effective system for the multiplication of seed by the encouragement of registered growers exists. No special staff is available to supervise them. Often the margin offered to induce registered growers to deliver seed back to the government is too small to attract growers and this is especially so when the actual payment is delayed by sanctioning procedures. In certain cases, as with cotton, where the production of better staple varieties is of considerable significance to the nation as a foreign exchange earner, the necessity of having the seed cotton processed in a ginnery in order to get the seed adds the further risk of a deliberate adulteration in quality. The owner of the cotton gin is seldom interested in the seed and by judicious admixture of inferior cotton in the ginning process may obtain more profit from the lint.

35. Faced with these meagre results and frustrating difficulties, and for lack of any specialised organisation to handle the intricacies of seed production efficiently, the department has had to resort to buying seed from selected farmers, and even from government food stocks, and putting its label on it, even though it has not pure seed. Very often such seed gives no benefit whatsoever to the farmer in quality or yield compared with ordinary market seed. The final result not only discredits in the farmer's mind the whole concept of buying improved seed but takes up a great deal of the time of the front line staff in the purchase, storage and sale of unsatisfactory material.

36. A third item of the "five firsts" is plant protection. This is a new subject and a great deal of useful work has been done in expanding the application of plant protection which relatively few years ago was non-existent. Nevertheless, the organisation is a confused mixture and, seen from the front line, the results fall vastly short of the need.

37. In East Pakistan, the confusion results from having two services, central and provincial, operating permanently in the district at the same time. In the provincial service a Plant Protection Inspector is attached to each district. This man, being in the same organisation, is at least supposedly in touch with the Thana Agricultural Officers and Union Assistants but he has no staff and has to draw his materials from the central organisation. The latter also maintains a Plant Protection Assistant in each district who has three field men, called Mukaddams to work with him but who cannot do much without information and help from the front line staff. Although the front line staff should be the first to know of pest outbreaks, they tend to be ignored because the Plant Protection Assistant takes his orders from the Deputy Director, Eastern Wing of the Central Organisation. He is not part of the local team.

38. In East Pakistan, the whole service is embryonic. The staff employed is negligible and so are the materials. In a Thana covering 50,000 acres, only three sprayers and one duster were found available, and less than 1 per cent of the area was estimated to be covered by plant protection. No scientific background, no study of the life cycle of pests, no timely diagnosis is yet available at district level. The limited extension staff can do little beyond demonstrating the value of plant protection on farms which happen to be adjacent to the Thana store.

39. In West Pakistan plant protection staff is on a more generous scale but there confusion arises within the provincial service itself. In each district, a Senior Plant Protection Assistant has under him a Plant Protection Assistant in every tehsil, each with 4 or 5 Field Assistants, so that in toto they exceed the agricultural extension staff. But instead of coming under the control of the district agricultural chief (the Extra Assistant Director of

Agriculture) and, through him, the remainder of the front line staff, they take orders direct from an Assistant Plant Protection Officer posted at divisional headquarters who is controlled by the Deputy Director of Plant Protection at Lahore.

40. In spite of the extra staff, there has been no appreciable addition to the spraying equipment. In one district visited, where a rice nursery spraying programme was due to start in less than two weeks, and where it was estimated that 200 sprayers were required for the purpose, only five sprayers and a small quantity of insecticides were found to be in stock.

41. While it may be essential to maintain some shock brigade somewhere to deal with major outbreaks of pests, the dual organisation now in being makes it impossible for the extension staff to bring plant protection to the farmer as an integral part of a package deal. At the same time these separate organisations are not for the most part adequately in touch with the pest situation as a proper front line service ought to be. While specialisation in the scientific background to plant protection work is highly desirable and is not yet available to a district, specialised personnel in execution means that plant protection staff, who incidentally have been given higher pay, are not fully occupied, while agricultural extension staff of essentially the same quality are unable to cope with the work. If the staffs were merged more men would be available for extension and all could be trained in plant protection.

42. These comments relate to the problem of plant protection in the front line because ultimately the best and cheapest objective is to spot and scotch the first small outbreaks of pests and to teach the farmer to do these jobs himself, with the front line organisation supplying him with the materials. Application by the farmer himself of plant protection at appropriate times is one of the integral features of the Japanese method of rice production. But the existence of a separate organisation tends to result in everything being treated on an epidemic basis automatically and everyone expecting the government to cure it. Of course, even in the best circumstances epidemics will occur, but better results would be achieved if all

front line staff and farmers, instructed in the use of plant protection, were mobilised to deal with them, the supply of materials to them being (as with fertiliser and seed) the responsibility of a supporting supply wing of a streamlined organisation.

43. Extensive work has been done by aerial spraying but its effectiveness has yet to be evaluated. There can be no doubt as to its value as an additional aid provided that as a result of intelligent and early survey on the ground, it is done at the right time - another reason for a much closer link with the front line staff. Economic aerial - or tractor - spraying is however confined to crops which cover solid blocks of land. In the present pepper pot scatter, it has practically to be confined to rice and sugarcane. One of the great advantages of reorganising farming patterns to the solid block system is the opportunity it gives to farmers of using these mechanised aids to protect more crops, but such reorganisation would clearly not be suitable for many parts of the country and may take years to achieve.

44. A fourth item in the "five firsts" is better cultivation techniques. Apart from crop sanitation which is mainly a regulatory problem, the chief purpose of these is to get a better seed bed and to keep down weeds. In many parts of the country unsatisfactory control of weeds seriously reduces the crop yields. New bullock drawn implements for achieving both purposes have been available in the country for more than twenty years but farmers hardly use them at all. In our tours we found a few demonstration models with Union and Field Assistants, but they were more in the nature of museum pieces than active advertisements for their greater use. This is quite understandable in view of the condition of the front line staff already described, but there seems to be more deep seated reasons for the farmer's reluctance to use them. This introduces a problem of extension which a mere advisory service does not solve - the need for some managerial help.

45. There are various reasons why farmers do not use these implements. In the first place, they are relatively expensive for the few days they are usable and on a small farm it may not pay an individual to have them. To

overcome this some organisation is needed which can buy, store and repair an appropriate number for a local farming community and hire them out. In the second place, many of the implements are too heavy for the ordinary farmer's bullocks. Lighter implements are manufactured in places but they are less satisfactory. The real and increasingly urgent difficulty is that the bullocks are not properly fed, particularly in densely populated areas. Since each farmer wants his own bullocks on his own small holding, there are too many bullocks and they are underemployed. To cope with this difficulty some organisation is needed to bring about a more rational distribution so that fewer and better animals can use better implements. Bullocks are badly-fed because little land is available for fodder crops. The solution to this more deep seated problem is the introduction of more balanced farming. The pre-requisite for this is the achievement of much higher yields by application of the "five firsts" thereby economising land, and through irrigation or improved water supplies. This takes the subject over the border into techniques which involve changes in current patterns of land-use where the element of managerial help becomes increasingly dominant.

46. The last item of the "five firsts" is credit. We have already explained that for the bulk of farmers credit against the securities of property is inapplicable. The security has to be the potential increased crop. We have also observed that the taccavi loan system from its past usage is regarded too much by farmers as a kind of disaster fund. The principle that loans must be repaid must be established. The penalties of the law may be an essential ultimate sanction but they are slow and carry a flavour usually connected with tax-dodging. The first sanction must certainly be to ensure that there is an increased crop from which to make repayment, in other words supervision of the crops in relation to the credit. The interlocking nature of the "five firsts" becomes at this point increasingly apparent. There must be credit, but to make it secure there must be a certainty that the other four "firsts" are being applied. Altogether they provide the means for raising the farmer from his present low level, but this can only be done by the application of management.

47. The present front line could hardly begin to perform such a service and in point of fact they usually have nothing to do with credit. Although we have come across instances where, by the initiative of local officials, the Tehsildar issuing taccavi loans has taken the Agricultural Assistant round with him for advice, under normal circumstances the credit issuing agencies whether revenue service, Cooperative Department, Agricultural Bank or Agricultural Development Finance Corporation, make their loans without any reference to the front line staff of the Department of Agriculture.

48. For lack of any other instrument, the Department of Agriculture has had to fill the gap when in recent years farmers in West Pakistan have increasingly clamoured for the help of machinery to develop new land or the help of the government to sink tubewells, while others in East Pakistan have clamoured for power pumps. As with plant protection, initiative has been shown in starting a new service from a very poor base. Similarly, however, it makes only a small, though valuable, dent in the problem.

49. In West Pakistan, an engineering wing has been established directly under the Director of Agriculture and the province has been divided into 6 parts, each equipped with an agricultural workshop supplied by I. C. A. Curiously enough, as with plant protection, the machinery wing has no contact with the front line agricultural staff and no common policy is worked out with them. At a station visited in our tour, the machines used were bull-dozers hired by the larger landowners to develop new land and wheel-type tractors for deep ploughing after fallow. The boring rigs used for sinking the tubewells were hand operated and hired by individuals in the same manner. The principle was first come first served, irrespective of the costs involved in the resulting movement of equipment and machinery. There was a waiting list for these operations as they filled a useful gap.

50. They made no contribution, however, to the kind of problem posed by a district like Sialkot. This is an area of small farmers and many joint holdings and there is great difficulty in financing private tubewells. The case for government initiative in planned tubewell development on a rational basis,

together with consolidation and accompanying changes in the farming pattern, is very strong, for there appears to be excellent ground water and no salinity. There is a vast area of good land along the Jammu border suitable for tubewell development, and elsewhere, if percolation wells could be replaced by tubewells, some of the land used for feeding bullocks could be growing cash crops. For the same reason - the ren oval of excess bulock stock - the area offers particular scope for experimentation in the operation of both big and small tractors in the routine farming operations, and even to pump water from Nullahs. But both tubewells and tractors must be operated economically and properly maintained. For such an integrated project area a mechanical wing divorced fron the front line is useless.

51. The "five firsts" represent the easiest and first stage for increasing production. The techniques which require alterations in present patterns of land use make a much bigger claim on the organisational and managerial factor. Consolidation has to be effected not merely in a fair manner but with a lay-out which will give the maximum possibility of increased yields. Mixed farming, to improve diet and soil fertility, and to diversify sources of income, requires advice on rotations end on animal husbandry; and organisation of milk and vegetable marketing. The introduction of machinery, to break land when it is hard and to facilitate an earlier planting date, to destroy stubbles for pest control and enable quick planting of an additional crop, to control weeds, and above all to reduce the need for bullock power, requires a concentrated use of tractors for economical operation and a full supporting workshop and spares service. To introduce irrigation, so that maximum use of the water may be made as quickly as possible with minimum wastage and optimum yield results, requires land levelling, layout of access roads to fields, accurate alignment, digging and maintenance of field channels, and instruction to farmers on water utilisation. The control of salinity involves scientific supervision of the quality and effect of tubewell water, compliance with its prescribed used for leaching and with prescribed rotations, and possibly the digging and maintenance of field drains. To introduce

a new pattern of bringing the advantages of large estate management to a peasant community in a new colony area or in a region occupied by very small farming, requires, in addition to much already mentioned, a planned layout of the farms so that crops can be treated economically in field blocks, and afterwards processed and marketed at cost for the producer.

52. No service exists in the country to organise and manage these matters and to carry farmers with them in the objectives concerned. Most of these techniques urgently require initial research and pilot schemes before the knowledge of what to recommend to farmers is gathered. The present condition of research will be discussed as a subject later in this chapter but obviously, for the conduct of these operations some thing wholly different and far better equipped than an extension service of the present type will be required. Very much the same considerations apply to particular projects of great importance to national production such as the conversion of the vast range lands to modern usage, the blend of soil conservation, fertiliser and machinery use to increase the production of the barani lands, the full utilisation of riverine lands, the restoration of the hill catchment areas, and the development of such productive regions as the Chittagong Hill tracts. For all these matters the country needs a new strong arm able to act and to handle all the varied agricultural aspects of a project with continuity to a successful conclusion.

53. We have discussed at great length the front line problems of the Department of Agriculture because they lay bare the heart of the difficulty in increasing production. Other departments have their part to play, but to break through in the battle for development concentration on bringing together those things which most increase output is the first priority in strategy and tactics. In the process it is essential to have an adequate cadre of men specialising as a team in the sole job of front line production and freed to do this by a supporting wing to get the necessary supplies to them. It is more than time to discard the erroneous belief that the country cannot afford the front line tools for the job of increasing production. What it cannot afford

is a well-staffed superstructure in the Department of Agriculture and in all the supporting nation-building departments - whatever their ancillary contribution - unless the increased production to pay for these is attained.

Research

54. Basic to any advance in agriculture is satisfactory research. Although the subject extends over other fields also, it is convenient to examine it here. We have already emphasised how much research is required before the farmer can be told with confidence what is the best thing to do in relation to many of the techniques mentioned in the last chapter. There must, in the first place, be overall countrywide surveys such as are required to know the quality of the soil, and the water resources above and below ground, where the best prospects lie in suitable grasses in the range lands, and the ecological knowledge to assist conservation in the hills. Then there have to be field investigations, followed by pilot schemes, for all the varied requirements of a developing farming policy. There is need to discover the crop varieties most suited to a region and to improve their capacity to give higher yields, to respond to higher applications of fertiliser and to resist disease. There is need to discover what fertiliser to use for various soils, the interaction between fertiliser, sowing date and spacing, the best cultivation methods, the optimum water requirements, the best cropping patterns responsive to modern farm management, the particular benefits and best kinds of machinery, the best layout of irrigation and drainage. Finally there is the whole field of economic and market research.

55. Although useful work has been done in individual cases, unfortunately in its present general state, research is full of deficiencies which make it totally unsuited to meet the immense and urgent challenge it is now required to face. In the first place no adequate funds are provided for it. With the low status accorded to agriculture this is not surprising, particularly as one of the characteristics of research is its continual greed for money with often only rare and uncertain returns. Some of its more staggering dividends in other countries must, however, be remembered. A recent input-output

analysis of research in the United States into hybrid maize, which took many years, indicates a net gain since 1914 of 1,400 per cent per year. There is increasing evidence the world over that no other investment in agriculture promises so much as that in agricultural science.

56. A second weakness is the absence of any planned approach to the problem just outlined. Research is now the concurrent responsibility of the Central and Provincial governments. Central support is mostly provided through three semi-autonomous bodies, the Food & Agriculture Council of Pakistan (FACP), the Pakistan Central Cotton Committee (PCCC) and the Pakistan Central Jute Committee (PCJC).

57. These bodies derive their income from cesses levied on agricultural commodities under a number of Produce Cess Acts, supplemented by small grants-in-aid from the Central Government. The total income of FACP for 10 years (from August 1949 to June 1959) amounted to approximately Rs. 112 lakhs or an average of 11 lakhs per annum. A disproportionate amount of this income is spent on non-research activities such as the Council's secretariat and the travelling expenses of a large number of Council and Committee members. The Council's share of expenditure on research schemes from its inception until March 1960 amounted to 66 lakhs or about 6 lakhs per annum and this limited financial expenditure had to be scattered over 87 schemes in the field of Agriculture, Animal Husbandry, Fisheries and Forestry.

58. The FACP attempts to promote research through grants to specific schemes submitted by provincial governments and universities. Due to lack of coordination in planning, limited worthwhile results have been achieved so far. Usually the Council bears only half of the cost, the other half being the responsibility of the provincial government. Too often schemes sanctioned by FACP remain unimplemented or only partly implemented because provincial governments do not contribute their share. The purely temporary nature of the schemes is a serious drawback to sustained research and only mediocre scientific personnel are attracted because of insecurity of tenure

and absence of continuity in the programme. In any case the funds are too inadequate for tackling problems of national importance in any effective manner.

59. The PCCC operates a technological wing, mostly concerned with research of an industrial character, through the Cotton Research Institute in Karachi which is very well equipped indeed. Its agricultural work is carried on almost in the same manner as the FACP, through schemes financed by the Committee and supervised by the provincial Departments of Agriculture. Most of the drawbacks relating to the FACP are applicable to this body also, particularly in respect of high administrative cost, short-term sanctions, dual control and disjointed efforts. PCJC's mode of operations is different. It has its own research institute, research sub-stations and seed farms. No significant advance has, however, been made by this body in the field of jute research although it has been in existence for quite a number of years. Results are not proportionate to the expenditure incurred and overhead administrative costs with a big secretariat are too heavy.

60. In the field of animal husbandry, fisheries and forestry, the Central Ministry of Agriculture conducts research directly through a number of research institutes, scattered over the two wings, most of which are too inadequately staffed, equipped and housed to serve the purpose, with the exception of a splendidly equipped forest products research station recently set up in Chittagong.

61. In our view the present method of discharging the Centre's responsibility for agricultural research through such a multiplicity of organisations gives no opportunity for adequate overall planning and ends in dispersal of effort and ineffective results. The concept of commodity committees originally arose in undivided India for giving special attention to the problems of cotton, sugarcane, jute and other industries. In the field of research, a commodity approach is apt to overlook many important problems that transcend the bounds of one commodity, and in certain respects inhibits the development of a balanced programme. Many aspects of research, such as soil,

farm management, crop rotation, mixed farming, agricultural economics, agricultural engineering, irrigation layout and land reclamation remain neglected under the present sub-division of work by commodity. It is by the same farmer and on the same land that cotton and wheat or rice and jute are grown. His problems regarding fertilisers, seeds, pesticides and implements do not greatly differ with different crops. Moreover, the scientific principles of plant nutrition and soil fertility, of plant breeding, pest and disease control and preparation of land do not inherently differ from crop to crop. Compartmentalism on the basis of crops, therefore, implies unnecessary duplication of effort and is wasteful of limited technical man-power and money. To remove these defects and to make the Central Government a more potent instrument for promoting research in agriculture and allied fields, the organisation and functions of the present avenues of research need considerable revision. In making this revision it would be important, of course, not to lose sight of the high priority in research which must be given to the major foreign exchange earning crops like cotton and jute, a requirement which was the main reason for sub-division on a commodity basis.

62. Research in the provinces has even more serious deficiencies, and these are particularly important because this is the point of impact between the needs in the field and the scientist. The Directors of Agriculture and Animal Husbandry are in charge of research, education and extension. They now have to handle a very large development and extension programme and find it difficult to give adequate attention to research problems. Under the Director, research in various fields is handled by different specialists who are individually responsible to the Director without any intermediate superior to coordinate their activities, and are liable to transfer away on other departmental jobs. There is hardly any team approach or institutional spirit among them. This has considerable drawbacks. Most problems are many-sided. Even the apparently straightforward production of a new variety of wheat or rice needs the cooperation of plant breeder, agricultural chemist,

agronomist and disease experts. The present arrangement encourages research workers to work too much on their own and with a view to publication of papers. There is little guidance from a national viewpoint and the important determination of priorities, and allotment of work to individuals is accordingly missing.

63. There is no research institute under the provincial governments at present in the real sense of the term. Although in Lyallpur in the West there is a competent body of specialists collected in one place around the college, their freedom for field study is very limited and their liability to do teaching work does not allow undivided attention to research. In Dacca in the East, the facilities are so meagre and the provincial government so indifferent to the needs of research that in spite of the existence of some competent research workers no appreciable headway has been made. There are a number of smaller stations in the West and a few in the East where good individual work is being done, but there is little coordination between the stations and many are poorly equipped. The most serious deficiency arising from this state of affairs is an inadequate contact between research and extension. There is not enough two-way traffic between the field and research stations and there are far too few outstation plots and pilot schemes.

64. Finally, and above all, the conditions of service, together with low pay and very limited promotion outlets, are not conductive to attracting competent scientists. Most young intellectuals are drawn away to the lucrative administrative services which present vastly superior opportunities for personal welfare and prospects. The position is particularly deplorable in East Pakistan where the scales of pay have not been revised for a long time. It is not out of place to mention that a matriculate stenographer draws much more salary than a person who has entered the Department of Agriculture after spending four or five years after matriculation in obtaining a graduate or post-graduate degree. Students who go abroad for special courses, and should be particularly valuable to the country, frequently do not wish to return, or after their return are discouraged by the apparent indifference of

the country to their knowledge, both in the low pay it gives them and in the frequency of transfer to other jobs which do not require their special knowledge. Gifted research workers look for other employment to the country's very great loss.

65. With the great need to encourage science and technology to play its vital role in the development of agriculture, organisation of research and the conditions of employment of research workers need a complete review, and we are making some suggestions in this regard in a later chapter.

Animal Husbandry Department

66. The department is really incorrectly named. No department is concerned yet with the interaction of crops and livestock or has an extension service advising farmers on this subject. The Animal Husbandry Department is really a veterinary department and operates quite out of contact with Agriculture. It has two main jobs, disease control and supply of stud animals. The farmer's need of these is less continuous than that of improving his crop yields but when the veterinarian is needed he is needed badly. Unfortunately the department's resources to assist him are very meagre and their effectiveness is confined to those parts in a district where they happen to be located.

67. The situation in one district in East Pakistan will convey an idea of the position. Under a District Animal Husbandry Officer there are Assistant Animal Husbandry Officers (trained vets, diploma holders) each of whom is supposed to cover five Thanas (about 75,000 farmers). Each has two Veterinary Assistants (matriculates of the same calibre and pay as Union Agricultural Assistants) to help him. This is the bottom rung of the Animal Husbandry ladder and it hangs considerably higher above the farmer's head than even the Agricultural ladder. The staff, like those in the Department of Agriculture, have a status and pay much below the medical, engineering or revenue collecting departments.

68. These front line men have no transport or office and only an infinitesimal housing allowance. Their drugs and instruments are kept under the bed in the hired room which serves as office. Any financial expenditure,

even the sanction of travelling allowance, has to be referred to provincial headquarters. The result of these conditions is that there is very little service to livestock owners. Union Councils in the district constantly complained of this and suggested an objective of a dispensary at each Union and an animal hospital at each Thana, and some offered to pay for such facilities. At present there are only three animal hospitals in the whole district. These were provided by the District Board. No animal dispensaries have been provided by the government in the district. Some have been donated by private persons and supplied with medicines and a veterinarian by the department, but the buildings are not designed for the purpose.

69. On report of an outbreak of disease an Assistant Animal Husbandry Officer is detailed to collect a blood smear, send it to Dacca for identification and then get vaccine to treat the outbreak. This may well take a month by which time the outbreak may be a serious matter. The preservation of the vaccine then presents a problem for there is seldom any refrigeration available. One senior Veterinary Officer advised us that a suitable vaccine giving immunity to rinder-pest was now available cheaply, but complained that he could get no cooperation from the public to use it. He favoured sanctions to compel isolation of infectious animals (on the analogy of human disease) and an obligatory system of vaccination when an area was declared infectious. Solutions of this kind are obviously dependent on a complete overhaul of the efficiency of the veterinary service, and at least on furnishing each Assistant Animal Husbandry Officer with a field microscope for diagnosis, a small laboratory and store for drugs, a refrigerator for storing vaccines and thermos flasks for carrying them to the field.

70. In a corresponding district in West Pakistan facilities for the farmer, although still patchy and with wide gaps, are normally better. In one district visited there were 13 hospitals and 15 dispensaries, in another 14 hospitals and 8 dispensaries, but in a third, less populated, district there were only 5 hospitals and a staff of only two Veterinary Assistants, while most had only one refrigerator and one microscope for the whole

district. The shortage of professional staff persists everywhere and in the district with 13 hospitals and 15 dispensaries there were only seven Veterinary Assistants. The remainder were run by matriculate dispensers. In addition, stock assistants were attached to hospitals. The hospitals themselves were actually hired buildings, except for 6 constructed by the District Board, and were mostly in bad condition. The staff were supposed to go on tour in adjacent villages to carry out castration of scrub bulls and inoculation and also to check the condition of stud animals let out to local land-owners. No transport was provided even for the Assistant Director of Animal Husbandry in charge of the district, and the actual touring depended on the funds in the budget which tended to run out towards the end of the financial year. Mass inoculations were carried out, to the extent one refrigerator permitted, by the ingenious system of issuing vaccine in thermos-flasks to all the staff on the monthly pay day.

71. Apart from the district staff, the Department maintains a number of breeding farms of varying efficiency and utility and supplies stud bulls through District Boards, Village-AID and Municipal Committees. Artificial insemination has recently been taken up on a small scale in both provinces and will probably in time reduce the need for loaning out stud bulls which in any case still cover only a small part of the farmer's demand. But the value of supplying improved stock is dependent in many parts of the country on first improving the standard of feeding, a matter intimately linked with an improved agricultural extension service.

72. The Department also maintains a poultry programme built on the introduction of foreign breeds such as White Leghorns, Rhode Island Reds and Black Minorcas, the cockerells being issued to villagers. With the introduction of mixed farming, improved poultry can provide an important supplement to diet and income; and the establishment of a broiler inudstry town supplies would be a useful derivative from this programme. The programme has, however, been vitiated by widespread diseases especially ranikhet. It is claimed that ranikhet is controllable by vaccination but

repeated widespread epidemics have decimated fowls and there can be little confidence yet that the programme has found the solution for village conditions.

73. From the production point of view, the farmer needs in the first instance, a vastly improved disease control service. Provision of better stock follows but becomes important only to those farmers who have improved their farming. The lore of crops and the lore of animals in government organisations has developed quite separately but on the farm they are one as far as agriculture is concerned, and the doctor is only called in to prevent or cure sickness in animals. It would appear that the present Animal Husbandry Department ought to be given back its old name of Veterinary Department or some such name as Animal Health or Animal Science Department. It should concentrate on the immediate priority job of servicing the country efficiently as a doctor, which it has never had a proper chance to do. Animal husbandry is a new subject here and training in it should be given to agricultural students, teaching them animal husbandry in its everyday contact with crops, to meet the time when their everyday contact with farmers will require this knowledge. In the meantime the best trained men in stock-feeding and management are veterinary officers who have been sent abroad for training in animal husbandry. These men must be retained to take charge of the stock farms.

74. The present stud farms have produced some prize winning animals but their large acreages are seldom an advertisement for good farming and the production of stock in general is often disappointing. With artificial insemination there will be less need for them and they could supply a long-needed place for proper experiments in animal husbandry and with it better general production of stud animals. It would be logical that this should be managed by agriculturists when these in turn have learnt their animal husbandry, possibly at the new universities, but not until that time. Members of the present Animal Husbandry Department, who are more interested in animal husbandry than in veterinary work could join suitable training courses.

The nomenclature Animal Husbandry for what is essentially a veterinary service may have had historical justification when no department did anything about the subject, but with the future need to make it a reality it would be better linked with agriculture even though it will be a long time before all agricultural extension personnel will be suitably trained.

Irrigation Department and Water & Power Development Authority

75. The Irrigation Department has always been in a different category from the Departments of Agriculture and Animal Husbandry. Responsible for the magnificent barrages and canals of West Pakistan it has been associated with the prestige of engineers rather than with the "illiterate person" level of agriculture. As far as farmers are concerned, it is a department with power actively to help or harm. It is not an advisory service. It supplies the water and collects the charges for it. This places it in importance second only to the revenue service. Government recognises this importance by pay scales, facilities and provision of staff analogous to the revenue service. Its position illustrates one of the curious anomalies from the past, namely that government has provided far more lavishly for the services collecting revenue from agriculture than for the services needed to increase the farmer's agricultural production.

76. Irrigation of course does increase agricultural production, but one of the first points to note about the Irrigation Department is that it is essentially an engineer's affair, supplying water at a field outlet point and leaving the farmer to distribute and use it as he likes. The best agricultural usage of water is not the department's business. Its staff are purely there to supply the water in the canals, see what crops are grown and collect the water charges. To do this the department is organised at the lower levels in two branches. On the supply side, an Overseer is assigned to roughly every 20 miles of a canal to inspect the outlet discharges and supervise a number of gauge readers. Above the Overseer comes a Sub-Divisional Officer and above him an Executive Engineer. On the revenue side there is

at the bottom rung of the ladder a Patwari who covers an area of 3000 to 5000 acres. His job is to inspect fields roughly once a fortnight and to record the acreages of the various crops at initial irrigation, at sowing, and as finally established. The water charges are based on his inspection and report. Above every ten (approximately) Patwaris is a Zilledar to check their work and above every five Zilledars is a Deputy Collector who also checks, and is responsible to the Executive Engineer for the revenue branch. The latter and his Sub-Divisional Officers of the supply branch also check the revenue branch on the grounds that if they do not check the field results as well as just supply the water, their supervision of the supply may not be so thorough. Generally all engineering staff are provided with houses and offices, and, although government transport is not supplied to all, the travelling allowance rules permit use of private motor transport. Lower down, the Patwari is not given transport but a horse is provided for the Zilledar.

77. The department is thus much better furnished to do its job than the Agriculture or Animal Husbandry departments largely because the system of charging for water by a differential rate for different crops involves recording every plot of each farmer every season. Unfortunately none of this is contributing to increased production. The engineers are not agriculturists and the agriculturists have not applied themselves sufficiently to the problems of irrigated agriculture. Very little research has been done on the interrelation between crops and irrigation in the different parts of the country and no extension service is provided to advise farmers on the subject. There is no demonstration of the benefit of levelling or of improved water conveyance, of the preparation of land for uniform water distribution, of the advantages of ridging versus flat cultivation, or of proper practices as to time and amount of water for different crops.

78. In a recent report from India, where a similar system has been inherited, it was estimated that half of the water supplied at the field outlet was lost to the crops in faulty conveyance and half of the balance was again lost in bad watering of the fields, that only 12 per cent of the irrigated area

grew more than one crop per annum, and that the irrigated area was only giving a quarter of a ton per acre additional produce compared with land receiving rainfall only. The position in Pakistan is not dissimilar. No resource offers such increased scope for production as improved water supply and it would be difficult to exaggerate the importance of having an organisation which can see to the necessary research, train personnel in irrigated agriculture, make the required demonstrations and see that farmers are provided with the necessary help and utilise water the best way. No such organisation exists at present.

79. The matter should be considered now, because in West Pakistan the principles of the distribution of water will have to be overhauled because of the problem of salinity, while in East Pakistan irrigation on a planned scale is about to be introduced. The question will arise as to where to draw the line between Irrigation and Agriculture. It might be argued that, as irrigation staff inspect the farmer's field for revenue purposes anyway, that department should undertake the duties of such an organisation. But a far more logical division would be to attach it to an improved agricultural extension service which is already supplying the farmer with the "five firsts". On the farm, irrigation is much more a matter of agriculture than of engineering, once the field distributaries have been properly laid out.

80. There is another factor to consider in making this judgement. If the system of charging for water was changed to a volumetric basis instead of the present individual crop basis, a change which is advocated by many officers in the Irrigation Department, the farmers on a distributary would simply pay for the actual water they received as recorded on a metre at the distributary head, dividing the charge among them according to the gross acreage owned. Each farmer could use his water for whatever crop he liked, and the elaborate system of Patwaris and Zilledars, which is the cause of considerable corruption, could be economised. The engineer would also be relieved of the responsibility of inspecting the fields - a timely help to the country when engineers will be in great demand for the Indus Waters replacement works.

81. At present, the distribution of water turns between farmers on the same outlet, called Warrabandi, is usually arranged among themselves, but in the event of disagreement the Irrigation Department has power to order the arrangements. This power could be transferred to an appropriate agricultural or revenue officer. Under the Department's rules, any land producing less than 25 per cent of the average is not charged water rate. Assessment of such failure, or Kharaba as its is called, is another source of corruption and it is open to doubt whether it will be desirable to continue it once a proper service for irrigated agriculture is provided for farmers. The transfer of all irrigation responsibility below the outlet would reduce such interests as the engineers now have in the crops, but this would be offset by the much greater benefit of having an agricultural organisation with a mandate to increase the productive potential of irrigation.

82. The passing to a new agricultural arm of the responsibility for irrigation from the distributary head would have other advantages. At present the land at the end of a watercourse usually gets less water than that at the head and for that reason is usually more affected by salinity. Increased attention by the new arm to the conveyance of water in terms of betteraligned (and possibly lined) and maintained channels should improve this situation. The redistribution of functions would also permit the Irrigation Department to spend more time on improving a number of aspects of its own work. As in the case of water courses, the land at the tails of canals is notoriously shorter of water than that at the head. There is in the minds of the farmers suspician that certain outlets are given more than their fair share of water. Relief from field work will give the Department more time to put outlets in order for impartial distribution and to provide gauges on them.

83. A further cause of unsatisfactory distribution of water is a fall in the quality of canal clearnaces, attributed in part to the fact that financial allocations have been reduced so far as to permit only sub-standard work. Economics in the revenue branch of the department should permit more generous allocations both of money and time to work of this nature which is vital to increased production.

84. The Water & Power Development Authority has already been created in each wing of the country because the country could not tolerate the slow tempo of traditional government departments in curing the problem of salinity and extending the vital infrastructure of water and power supply. WAPDA's sphere of operations is essentially in such infrastructure but, as has already been emphasised in the discussion of salinity in previous chapters, the very investment which WAPDA is making in tubewells, and which may be necessary in future in major drainage, will be dependent for its efficacy on the way farmers use the water, and possibly in places on field drainage on their lands.

85. It is too early to know yet what particular method of combating salinity will be most appropriate in any particular area but it is already certain that unless farmers follow the right procedures and rotations needed to reclaim their land, salinity will not be cured. No organisation yet exists to tell farmers what to do, to finance where necessary their field drains, and to see that they do it. WAPDA itself has an immense job on the engineering infrastructure side and is unsuited for the agricultural follow-up. The Soil Reclamation Board whose scientists have devised, and will continue to be needed to watch over, the necessary procedures, has no extension arm to see that they are carried out. The most logical arrangement would be for a new agricultural extension arm, already carrying the "five firsts" to the farmer and advising him on irrigated agriculture to take on this duty in the areas affected, in close cooperation with the scientists of the Soil Reclamation Board. The matter has already become urgent in the Rechna Doab where WAPDA will have completed tubewells by the end of 1960 with no provision for the correct agricultural use.

86. In East Pakistan WAPDA has taken over the direction of all irrigation. Confronted on the Ganges-Kobadak Scheme, the first big irrigation project in the province, with the possible availability by the end of this year of irrigation water for 150,000 acres where farmers are unused to irrigation and no extension service exists, it has set up its own agricultural wing to

fill the gap. For the reasons stated above it would be more logical if this duty were transferred in due course to the new agricultural extension arm.

87. One of costliest drawbacks of the absence of such an arm in the past has been the huge time lag (particularly noticeable on the Sukkur and G.M. Barrages) between the completion of irrigation works and relevant production from the land. An organisation which can prepare the ground, devise the best systems of irrigated cropping, and run pilot schemes to educate farmers so that full productive advantage is taken of the water as soon as it is available, will be essential in future projects to avoid heavy interest charges piling up on expensive capital works with no national remunerative return to offset them.

88. A further desirable feature of having such an instrument is that in any future project it is essential that the crop needs for irrigation water should be worked out afresh in the light of today's need for high production agriculture. This should be done before the final decisions are taken on the area to be included or the design of the canals and headworks. Present designs are still based on supposed agricultural needs relating to a past age. It is sometimes claimed as a credit that Pakistan's irrigation system has the highest acreage per cusec of water of any in the world. There were, no doubt, strong financial reasons in the past for spreading the cost of capital works over as much land as possible and social reasons for spreading the benefit, but the actual formulae adopted have spread the water so thinly that the country has paid a terrible penalty in the increase in salinity, while the individual farmer with low water supply and low yields has been condemned to a low income. The extra water required for curing salinity forces the matter to the foreground, and it is essential that at the same time full consideration should be given to what are the water needs of crops - apart from reclamation - to give optimum, not minimum, production with today's aids to farming.

89. We understand that WAPDA are now making an estimate of the total resources of water in West Pakistan so that a picture can be formed of how

much may be available from storage, how much required for replacement of waters lost to India and what remainder might be available during the flood and during the low water season. Taken in conjunction with potential tubewell development, it will then be necessary to determine how best to allocate these resources over existing areas and projects, both to put an end to salinity and to give crops the water they really need. The existence of a strong agricultural arm, fully knowledgeable in these needs, will be a very necessary complement to the engineering and treasury view when these decisions have to be arrived at. At present, on existing new projects, lands are being sold and canals dug before the best overall distribution of national resources of water, or even the best distribution in the locality under today's conditions, has been reviewed.

90. As already stated, one of the greatest disincentives to production, raising serious doubts among farmers as to the value of investing in modern aids, and causing heavy damage every year, is the absence of adequate protection from floods and the absence of adequate drainage for storm water. Much more effective action is urgently needed by either WAPDA or the Irrigation Department to remove this danger from farm lands. This is their sphere of responsibility; and relief from the cropping and agricultural problems of irrigation should enable them to discharge this great national priority duty with the minimum of delay.

91. While the short term aspect of flood control is protection and the draining away of storm water before it damages crops, villages and towns, a long term solution must cope with the much more difficult problem of improving the catchment areas by reafforestation, soil conservation and the damming of streams and Nullahs. Soil and water conservation work is also required over vast areas of the barani lands in West Pakistan to improve ground water supplies, restore perennial flow in the streams and utilise the water for small irrigation projects. In East Pakistan there is a need for such works as polder banks against the sea, drainage, interlinking of streams to improve irrigation facilities and digging out of tanks. There is, at the

moment, no organisation to tackle these problems on a project basis and they cannot be solved by the isolated effort of any individual department. The main difficulty is the provision of labour. This is not a matter for a new agricultural extension arm, but it may well require the creation of some new organisation which can run a national public works programme as a supplement to existing departments.

92. The provision of labour, in spite of the existence of large numbers of unemployed, is not a simple matter. Already the Irrigation Department, behindhand with drainage, is urgently in need of machines involving heavy calls on foreign exchange, because in places it has been impossible to recruit labour. The determination of whether or not to pay higher wages and use a national asset, instead of spending foreign exchange, even at a higher internal money cost for a project is not easy to make. It would be facilitated if some national organisation were entrusted with mobilising spare labour, both seasonal and local and permanent, and getting some of these national public works done. This suggestion is also relevant to the subject of communications which is equally vital to production.

Cooperative Department

93. With the exception of a small area of cooperative farming in the Punjab, the Cooperative Department has had only an indirect connection with increased agricultural production. It owes its origin, rather, to the individual enthusiasm of certain government officers in former days who wished to encourage people in rural areas to emancipate themselves from middlemen and moneylenders. From this beginning it has grown into a combination of a movement with a vertical structure (ranging from primary societies in the villages to Central Cooperative Banks representing a Union of such societies, to an Apex Bank at the provincial level) and a department headed by a Registrar and staff supervising the movement. The department deals with cooperatives in general but is here discussed in its relationship with farmers. Its main concern has been access to cheap credit, so that small men by combining together could help themselves to improve their

incomes and establish a better bargaining position. Unfortunately this extremely important objective has so far had only a modicum of success in West Pakistan, and none at all in East Pakistan.

94. There are a variety of reasons, historical and otherwise, for this comparative failure. In early days one of the strong tenets of the cooperative movement was the principle of unlimited liability. When prices were depressed, those with assets found that they had to pay the debts of other members who had none, and the movement lost favour. After Independence, when the banking system, hitherto managed by Hindus, collapsed, the co-operatives were called in to help fill the gap. They performed a good service for the country in that respect but in the process the Cooperative Central Banks who financed the primary societies switched their interest to commercial loans to individuals. In some cases, particularly in West Pakistan, this has had the advantage of attracting considerable private deposits and as an agent for mobilising savings this has been useful. But the effect has been to turn the upper tier of the cooperative movement into ordinary banking, financing the very merchants against whom it was designed to protect the small man, and neglecting the primary societies. In other cases, particularly in East Pakistan, for lack of commercial experience many of the Central Banks became insolvent.

95. In the primary societies, where credit has been advanced on personal security, there has been no certainty of its application to agricultural usage and the repayment record of loans has been extremely poor. Where multi-purpose societies for supplies and marketing have existed some have brought discredit on the name when members of the managing committees have used the system to buy cheaply themselves and sell expensively to the members, while all of them have found the problem of marketing difficult. Lack of knowledge of commerce, of information about prices and of suitable managers and stores, have proved major stumbling blocks to success. The Department has supplied secretaries but these have been as inexperienced as the managing committees.

96. In these circumstances it is not surprising that, with the exception of parts of the Punjab, in our tours of the country we found the state of the cooperative movement generally moribund. Nor was it surprising that, where there was enthusiasm, the common complaint was of insufficient funds. There was also some feeling of defeatism and lack of leadership among the non-official cooperators in the villages.

97. The cooperative farming societies in the Punjab formed an important exception. These were basically settlement societies founded ten years ago wherein the land was leased to the society but farmed individually. Here the use of better seed and fertiliser has been encouraged, the productivity of marginal land has been improved and the societies are solvent. Cooperative marketing has not yet been started nor is there any managerial element to encourage production. They do however represent a potential model from which, by changing the farming patterns to a system of cultivating in large blocks, introducing a managerial element, and extending the benefits of all the "five firsts" and other aids including marketing and possibly processing, objectives outlined in this report could be obtained. We understand that certain parts of the G.M. Barrage area have been reserved for extension of this cooperative model which, although possibly with alternative types of tenure, we consider to be of great potential significance to the country.

98. At present the Cooperative Department is very anxious to blow a breath of fresh air through this moribund atmosphere, by establishing better training courses for their staff and by going into partnership with Village-AID in propagating, in the Village-AID development areas, renewal of multi-purpose societies at the Union level with the Village-AID Department contributing half the cost of Union godowns. Outside the Village-AID development areas, the intention is to establish at least a cooperative credit society in every Union.

99. In addition to this, in several parts of the country during our tour, we were informed that instructions had been received from the provincial government that in future all supplies for farmers were to be channelled

through cooperatives. This is an understandable objective in view of the very successful part which cooperatives have played in raising the standard of living of farmers in other countries, a particular analogy for Pakistan being those of Japan, the Philippines and Mexico. It is also a particularly desirable objective. When, as in Pakistan now, farmers sell at depressed prices at harvest to traders, pay exorbitant interest for inadequate credit and have no reliable source of supplies, government must take some initiative to help them. But the great feature of doing it through cooperatives is that the people themselves manage their own affairs instead of relying on a bureaucracy to so.

There is however no magic in cooperatives. They will only succeed if they perform economic functions better than these are being done now. On their past record there is no reason whatever to believe that they will be, as

reliable instrument for getting even the "five firsts" to the farmer. We have throughout the report emphasised what a tremendous and interlinked exercise is involved in servicing farmers with what they need. A decision to use cooperatives for the supply and credit section of this urgent job, in their present state, runs a considerable risk of just remaining a slogan without effective results. It is extremely important for the country, both in the short and long run, to avoid further failures in cooperatives. In this respect two additional points merit consideration.

101. The first point is that until now the government has never really put its back into supporting cooperatives. In terms of status and pay the staff of the department are as unimportant as that of the Agriculture Department in a district. An Assistant Registrar is in charge and under him a number of Inspectors covering areas in accordance with the number of societies in that area, which may range from a Thana to a sub-division in East Pakistan and from a half to a full tehsil in West Pakistan. These are large areas and although Sub-Inspectors are provided for approximately every ten societies, no office, housing or transport is provided for anyone below the Assistant Registrar. The job, of course, hitherto has been mainly sedentary, involvin

the promotion of cooperatives, presence in all meetings where members are illiterate, recording of minutes and audit. Many of the staff we met on our tours, although often worthy men, would seldom have been chosen as energetic types with business acumen. Their morale, as might be expected from their status and the general atmosphere of failure in which they have had to operate, was not high. An additional factor of the greatest importance in this respect was the low opinion which past governments appeared to attach to their department, as evidenced by the very frequent changes of the Registrars.

102. Government support of the cooperatives has been even weaker over funds than over staff. Practically nothing in the way of capital has been contributed by government to supplement the capital investment of members and so give an adequate base to support the borrowing needed. The absence of such support has contributed to the delays and untimeliness of loans to farmers at the primary level.

103. The second point concerns the dual nature of the cooperative job, which places a great strain on the staff of the department in terms of a conflict of loyalties. In communities where a desire for cooperation has arisen spontaneously among people this problem hardly exists, but in Pakistan, the initiative for cooperatives continues to come almost entirely from the government. There is nothing unusual in this, for the position is the same in most countries with poor and illiterate rural communities, but it is essential to recognise that this situation involves the staff in trying to pursue two different objectives at the same time. On the one hand there is the need to ensure that an efficient service is there so that farmers as individuals can and do improve their production and increase their incomes. In this objective the organisational and managerial aspects have to be dominant. On the other hand, there is need for the farmers themselves to participate in the process and learn by experience to manage their own affairs. This is an extraordinarily important objective in today's world. All development has as its ultimate aim the raising of the dignity of man both mentally and

materially, but there is an increasing risk in the jet-age pace of development, of the common man being left out and of the objective of the dignity of man being thereby defeated. The problem is therefore to give the right degree of guidance. If too much guidance is given there is no sense of participation whereas if too little is given the people may merely participate in failure.

104. These considerations lead us to the following conclusions about co-operatives. In the first place, it is essential that the government should display its conviction that the development of genuine and successful cooperatives is one of the cardinal points of its farm policy. This implies a number of actions--continuity, conviction and sense of dedication in those appointed to run the departments;overhaul of the status and quality of the personnel; much better training in commercial and managerial functions;concentration on making individual societies successful rather than dissipation of effort over a wide field; stricter control over the repayment of loans, and in this respect, involving the introduction of supervised credit linked with agriculture; readiness to supplement the capital investment of members with state funds so that societies will not have to refuse loans because of insufficient resources; in this connection the state should advance long term loans. No dividends should be paid unless the society is on its feet; finally overhaul of procedures for the extension of loans so that farmers can get short term credit " over the counter".

105. Our second conclusion concerns the priorities to be followed in the guidance programmes. We have already stated our conviction that both good management and self-management must be integral parts of the policy but the question of emphasis on one or the other must vary from time to time and place to place. In the vast and urgent job of agricultural development now confronting Pakistan the priority emphasis must, in our view, be for the time being on good management. This does not mean that people do not need to be consulted and connected with the process, but it does mean that we think it more important at the moment to help farmers up each rung of the ladder than to tell them to get a ladder and climb up themselves.

Preoccupation with the need for participation must not imperil the more important present priority of setting up an organisation which can furnish the farmers all they need to achieve a much better income. A scheme which can really do this even though it is managed initially for them, is more urgently needed than exhortations and lectures, important as these latter are as aids towards that end.

106. With these views, we believe that cooperatives should not be entrusted immediately all over the country with the job of supplying farmers. This should be a task of the new agricultural extension and supply arm. The cooperative movement should however be very closely associated with this arm and it should be an accepted cardinal principle that, while the new arm prepares the way with the one objective of increasing production, the cooperative movement should follow on with the secondary objective of self-management, eventually taking over a going concern and training and equipping itself to keep it going. The twin objectives are not rivals but complementary to each other and should be pursued together. When the new organisation really has seen that good godowns are built at Union and Thana level, that better seed really is produced, that fertiliser and plant protection materials are available when needed, and that other aids, ranging from provision and maintenance of farm machinery to rice hulleries, jute presses and cotton ginneries in their appropriate places, are connected with farmers to help them to stand on their own, then the scope for cooperatives will be where it should be -- covering a package deal which really can enable them to perform economic functions better than they are being performed now.

Agricultural Credit Institutions

107. Apart from cooperatives, institutional rural credit is handled by the Agricultural Bank and the Agricultural Development Finance Corporation, about to be merged, and the Taccavi loan system of the Revenue Department. All of them together, including the cooperatives, are thought to handle only a fraction of the rural credit used, the bulk being provided by friends and relations or by merchants who purchase the crops. Unscrupulous and greedy

as these latter classes may be, they are much more convenient than government institutions. The Agricultural Development Finance Corporation (including Agricultural Bank) is slow to act. It lends money only on sound banker's terms and mainly against property in land. To get his loan a farmer has to obtain certificate of his title from the Patwari of his village. He has then to await independent confirmation by the bank's officials of the Patwari's certificate, and then later to register the mortgage with the Tehsildar. As the bank's offices have so far not penetrated beyond a few towns in a district the process often involves a great deal of travelling, the procurement of witnesses, and a good deal of tipping to every official concerned to reduce the delay. The bank's clients are therefore, largely confined to important landowners. The Taccavi system, including agricultural loans in East Pakistan, has until now been usually operated as a somewhat indiscriminate handout of small amounts by Revenue Department officials to meet disasters or to assist ~~in some cases men of influence~~, and has had an even worse reputation for repayment than the cooperatives.

108. Fully conscious of these shortcomings, and pressed with the urgent need for development, each of these institutions is anxious to expand its credit services particularly to the smaller man. There is some danger that this may result not only in some confusion but in excessive indebtedness. None of these institutions is in a position to ensure that its loans are actually used for increased agricultural production, or to supervise such use, and farmers may be tempted to borrow what they can from government while continuing to borrow from their other sources.

109. Although rural credit is a vital need at every rung of the ladder leading farmers to increased production and higher income, the problem of providing it without excessive indebtedness is exceptionally difficult. Without any change in his present farming patterns a farmer needs, for productive purposes, short term loans for seed and fertiliser and sometimes for hiring additional labour. He also needs short term loans for unproductive purposes merely to cover living expenses or to fulfil the social obligations of marriag

death and other occasions. Non-institutional sources of credit meet these needs by buying his crop cheaply and selling it later at much higher prices, or by supplying goods at high profit margins, or merely by charging phenomenal rates of interest. They cover their risk in this manner and also through judicious knowledge of the personality and property of the borrower. A farmer also needs loans for longer term productive purposes such as replacement of bullocks, purchase of implements, repairs to a well, etc. In such cases, if any large sum is involved or if the family cannot help him, he will probably have to sell his land to get the loan. Naturally the whole system is flexible and where the farmer's property is small, and his need to buy back later in the year for subsistence high, his credit is low and he is only likely to get a loan on the security of his already small property, part of which he may later have to sell to repay the loan. These latter conditions are particularly prevalent in East Pakistan and are a major cause an increasingly large landless rural class. They then swell the tenant class which, with the prevailing system of land tenure, places them in an increasingly weak position vis-a-vis landowners, and operates as a very strong disincentive to production.

110. This is the anti-thesis of what the nation needs, and the development of an efficient system of institutional credit is, therefore, an urgent matter. The problem is to replace the local moneylender, who may be a merchant or a landowner. It is probably useless to try to replace him in all respects. Unproductive expenditure is impossible to control and, except for new colonies, financing living costs is exceedingly risky. It is essential therefore to concentrate on methods of raising yields and incomes, and so resolve the problem of living costs. In this respect certain points about the moneylender are significant. He lives in the area and knows his farmer. He is available on the spot when a loan is needed, and he controls the marketing and often the processing of the crop. These conditions do not apply to the Agricultural Bank nor to the Taccavi system but they could apply to the cooperatives, which is an additional reason for ensuring that they really become a success.

111. In the meantime, the answer points once again in the direction of a new organisational arm in agriculture where a staff member supplying the "five firsts" from an office and store at the Union level can issue credit against his personal supervision of the application of these aids. Beginning at first with only the issue of seed and fertiliser in kind, other short term credit for the hire of improved implements or sprayers (insecticides being now provided free) can be added as the individual farmer's reliability for repayment becomes more certain. These are the first tools for building up higher production and with it higher repayment capacity. As the organisatio builds up proper storage and the necessary stores and sales personnel it ca begin to offer marketing, and where appropriate, processing facilities. For these it will itself require, apart from funds for capital construction and running costs of processing and marketing, substantial funds of a turnover nature for down payment to farmers, but it will recoup its loans to farmers from the down payments and the running costs of marketing and processing from sales. These funds could be obtained by the organisation from the Agricultural Bank. For farmer's longer term loans, which would be rarer, the organisation would probably at first have to obtain some security, and these might be negctiated at the more responsible Thana level, although at the Union they would be supervised for actual purchase of the bullock or execution of the work concerned.

112. As the organisation moves over to dealing with changes in the farm ing patterns, additional credit needs, both short and long term, would ari se These needs would of course vary with the project concerned. They might take the form of contract ploughing loans recoverable from a group of farmers out of their current crops, or of expenditure on levelling, on field distributory construction, tubewells or field drains, items which would require repayment over a number of years. It will be clear that the provisi without economic loss, of all these loans to communities of poor farmers depends in the first place on having an organisation which as far as possibl can keep the relevant parts together as interlocking agents of each other. I

is secondly dependent on good management. But thirdly it is dependent on a general awareness among the farming public that these loans will not be handouts to them by the government but investment by the rest of the community in their future and that they have to repay them. The dilatoriness in the past about repaying loans makes it desirable to consider the problem of security a little further.

113. The strongest sanction at present for the recovery of loans is through the Revenue Department. In spite of mortgages, the Agricultural Bank, when its half-yearly instalments are not paid (and they are often overdue) threatens the borrower, not with a civil suit which takes ages, but with recovery through the land revenue procedure. The importance of this is that failure to pay an attachment under land revenue can lead to summary arrest. A Tehsildar may in practice pay less attention to such attachments than to the payment of land revenue itself, but if the District Magistrate orders it, the risk to the borrower will be immediate. In East Pakistan the process is much slower but the West Pakistan procedure is, we understand, likely to be introduced there. An interesting example of the sanction behind the Revenue Department was exhibited in our tour of the Haor area in East Pakistan where after the agricultural service had been unable to get payments due for water supplied from power pumps, 90 per cent was paid as soon as the Sub-Divisional Officer intervened.

114. As the standing of a new agricultural organisation is not likely to be high at first it will be desirable that the loans it makes should be covered by undertakings to repay at harvest with the provision that in case of default, loanswill be recovered as arrears of land revenue. With loans in kind and properly supervised, the actual burden on the revenue service should be small but the support of its ultimate sanction will be important. The organisation should, however, deliberately build up gradually its own security background. This will be primarily a matter of demonstrating to farmers that its services are so helpful that the penalty of having them cut off, because of unjustified failure to repay a loan, is not worth incurring. Other important

factors in security for loans will be the control of marketing and particularly processing. It may be desirable, where existing private enterprise is not already established, to permit only a new organisation (and later on the co-operatives) to own and manage processing plants in certain areas. Additionally the organisation would have to build up its own reserve fund to cover inevitable bad debts. This might be done by adding a charge to the interest rates. There is no reason why these should be exceptionally low for they will in any case be much less for a vastly better service than those at which non-institutional credit is available. In time and with good management a combination of these elements should build up a background of security so that Taccavi loans and Revenue Department sanctions need rarely be involved. With the setting up of a new organisation which can give farmers supervised services of this nature it would be unnecessary for the ADFC or the Agricultural Bank to operate in the front line. They would remain, as now, normal banking institutions for men of property.

Village-Agricultural & Industrial Development

115. Village-AID is unique among the departments mainly concerned with agriculture. It actually has a reasonably satisfactory establishment in the front line specialising in village work. At present its operations are confined to certain selected parts of different districts covering in all about a fifth of the country's cultivated area, but where it operates, it concentrates. By contrast with the Animal Husbandry Department which ends, remote from the farmer, in a Veterinary Assistant, without housing or transport, to cover 2 1/2 Thanas, and with the Agriculture Department which ends at best with a Union Assistant (without transport and with a Rs.5 office allowance) to cover 10 villages, Village-AID ends with a Village Worker covering two villages, who is better paid than Veterinary or Union Assistant, is provided with a cycle, a Rs.5 cycle allowance and a Rs.10 house allowance. At the Thana level where Animal Husbandry still has no man and Agriculture has one Thana Agricultural Officer on a bicycle, Village-AID has two Supervisors on motor bikes and a Development Officer in a jeep. The main reason for

these much more adequate facilities and staff is that, while the former departments are dependent on provincial finance and attitudes, Village-AID has been largely financed through Central Government and from foreign aid funds. There are particular reasons for this differential treatment and it is important to appreciate them.

116. Village-AID springs from the concept of progress through community development which has become popular in so many parts of the world since the war. This concept has a very strong appeal both philosophically and politically to believers in democracy because of the emphasis it places on participation by people in their own affairs. The arguments used in favour of cooperatives on this account apply all the more strongly to community development because it covers all aspects of progress, and not just the economic emancipation, of the small man. In the conflict of ideologies in today's world, progress by participation, as opposed to massive coercion by a small clique through a state machine, has values for civilisation which foundations and governments in the Western world have been very ready to support with financial aid. Being a new concept it also offers opportunities for the injection through the new organisation of financial and technical assistance such as are not easily arranged through routine departments.

117. There are other reasons why community development has a strong appeal. One of the most puzzling problems in development is to discover and stimulate whatever it is that motivates people to progress. This is by no means so simple a matter as issuing orders and laying on aids. Many sound proposals for development have failed because of the old truth that you can take a horse to the water but you cannot make him drink. And for people, as for animals, the degree of thirst has to offset the fear of being less secure and the fear of extra effort if any change in the customary drinking place is suggested. In places where people seek a way out of present frustrations in a desire to get ahead to higher standards, they may welcome the techniques to do so, but in other places the question of motivation may be of paramount

importance. If farmers in Mymensingh see little virtue in the meticulous techniques of the Japanese method of rice production because their wants are small, an area of rich land will be giving less than it should to the national food needs. If those in Kushtia resist rectangulation for a proper layout of water conveyance channels because they think the rainfall which was good enough for their grandfathers is good enough for them without all the bother about irrigation, the expensive Ganges Kobadak Scheme may become a white elephant. If tribesmen in the range lands see little value in modern ranching because the ownership of large herds is socially more important than cash, their potential contribution to the nation's need for meat and wool will be lost. Examples could be multiplied all over the country. The hillman who grows maize and cuts trees because he distrusts any alternative for food and income, the Punjabi who uses reclamation water for his cotton crop instead of leaching his saline land, because he puts current income before capital improvement, the Multani who mixes desi cotton with his Lassani and cares more for his home-spun than for the national need for foreign exchange — all are holding up progress. Orders and penalties matter but their cost and effectiveness depend on people's understanding and conviction of the value of new ways and new techniques.

118. Village-AID is a specialised instrument in promoting this understanding using the twin themes of participation and motivation. Its staff are trained to search out and encourage the thirst for progress and to do this by trying to appreciate the needs that the people feel themselves and to get them to appreciate the needs of the nation. By contrast with other development departments whose duty is to get a move on and get something done, its virtue lies in finding ample time to discuss with villagers why it is worthwhile doing anything at all and if so what. In the process it may well be found that indifference to some proposed technique important to the palnner from outside, changes to enthusiasm when it is found to be the one way of paying for some other need more strongly felt. Desire for a water supply, a cinema, a school, or a dispensary may be much stronger than

inclination to change a pattern of farming, but the latter may be the key to attaining it, for Village-AID very wisely insists on the necessity for self-help as well as outside help. In essence, therefore, the scope of Village-AID runs over all aspects of country life, and impinges somewhere on almost every government department. In a country where so many people are still illiterate it would be difficult to exaggerate the potential value of having a service of this kind, divorced from routine departments and able to spend time awakening the countryside to its own and national chances of progress on a scale much wider than that of one department.

119. In our tours of the country, we found that the training centres run by Village-AID, for both men and women, were very well equipped with modern technical aids to demonstration and were impressive in the spirit they conveyed of social progress through participation and motivation. It was also apparent that the staff in this field were often of better quality and had more enthusiasm for their work than the staff of routine departments. Undoubtedly the better staffing and facilities and the attraction of a new creative programme played their part in this result, but, although the reaction of villagers varied and in places they regarded Village-AID as a collection of "Do-Gooders" to be exploited, in general it seemed to us that those in the countryside in touch with it welcomed this service as closer to them physically and more sympathetic mentally.

120. There is, however, one aspect of Village-AID which is causing a great deal of controversy. Apart from its main concepts described above, Village- claims to be the sole extension service for all departments. This claim is based partly on the argument that the country cannot afford separate extension services down to village level and that a multitude of different advisers would anyway confuse the villagers; and partly on the argument that Village-AID alone uses the right method for mass communication and motivation. With this claim in mind its workers are trained in the simple elements of agriculture, animal husbandry, forestry, health and public works so that, apart from social subjects like home economics, conduct of committees,

cleaner streets, improvement of wells, filling in of borrow pits, encouragement of handicrafts, management of youth clubs and so on, they are aware of methods of improving all the bread and butter aspects of life in the village also. A corollary to this policy is the desire that the departments withdraw from the front line but maintain experts a little farther back, say, at the Thana level who can be called forward if any problem requiring more specialised knowledge arises.

121. This policy has not been accepted as suitable in all cases, particularly by the Department of Agriculture, and Village-AID is criticised for boosting its value by claiming credit for all rural progress. We sometimes ran into situations on our tours where the Thana Agricultural Officer and Union Assistant were trying to demonstrate the benefit of compost and fertiliser on one farmer's field only to find that Village-AID, quite on its own, was doing the same thing in the vicinity and offering to pay for half the cost of digging the compost pit and of the fertiliser, a method of salesmanship in which the department could not indulge for lack of finance. This unreconcil controversy led to some rivalry and animosity, the Department of Agriculture feeling that Village-AID was trespassing outside its proper ground and Village-AID demanding that Agriculture should concentrate on providing better experts behind the front line. In parts of the country we found a strong desire among staff of both sides, because of the futility of this rivalry, for one organisation for development. whatever the name..

122. This controversy is very relevant to the problem of assessing what should be the relationship between Village-AID and the new organisation in agriculture which is needed to supply the many techniques and services required for increasing the farmer's production. Excellent as its values are in their own field, it is apparent that Village-AID is in no position to execute the functions which have led us to feel the need for such an organisation. Certainly a principal activity of Village-AID has been demonstration but its field is motivation not organisation and supply. It is in no position to operate even a package deal project of the "five firsts" for farmers. It cannot

produce better seed. It has no stores or supply line. It cannot manage loans. Yet these are the simplest services to farmers which an agricultural front line ought to provide and in a manner which makes it all available through one office near the farm. Still less can Village-AID be contemplated as the front extension line as the problem passes over to more complicated needs like the right preparation for irrigation, the introduction of machinery, or the management of farm blocks, marketing and processing.

123. These considerations illustrate a truth which we are anxious to make prominent in this report as it is often insufficiently appreciated. The problems of agricultural production are not likely to be solved by lectures and demonstrations alone. There is in the country too optimistic a belief that not much more than this is needed, and too little realisation that they require for their solution a great deal of managerial capacity and a vastly improved organisation. As one farmer-critic of Village-AID put it to us: "We do not need all the emphasis on being treated as a sort of diseased section of society who have to be taught how to live! Rich people learn how to live quick enough. What we need is an efficient system of supply in all respects and the removal of disincentives which stop us from pushing up our incomes. This is not to state that Village-AID is useless in increasing production. Far from it. But it does illustrate the particular niche which it can best occupy, which is as a forerunner and a motivator and as a point of contact where the additional patience and time can be applied which an action organisation lacks.

124. Another reason why we feel that Village-AID cannot be a satisfactory substitute for a front line arm in agriculture is the very great variety of subjects which the Village-AID Worker has to cover. Recently evaluation of community development in India estimated that this number amounted in some cases to 128 jobs for 10 different departments. While this may seem an undue exaggeration of the present scope of Village-AID in Pakistan, the increasing tempo of development is likely to increase the number and multiplicity of demands on a service claiming to be the sole front for all extension work. In the urgent situation in Pakistan today the promotion of increased

agricultural production requires the full-time attention of a service devoted to that objective and nothing else, and the suggestion that Village-AID could do it if it devoted more of its time to agriculture would not only fail to meet the need, but will also fail to achieve the many social objectives for which Village-AID is the most suitable, and indeed the sole instrument. These considerations have become all the more pertinent recently since the creation of two other new elements in rural life, the National Development Organisation and the Basic Democracies, with both of which Village-AID has now been linked.

The National Development Organisation (N.D.O) & Basic Democracies

125. The NDO is a new organisation combined with both Village-AID and the Basic Democracies. In each district where Village-AID operates a Deputy Director of NDO (who ranks higher in pay than all but Revenue Department) now heads the Village-AID staff and supervises the Development Officers at the Thana and Tehsil level and the Supervisors and Village Workers under them. The Basic Democracies are also a new organisation. They consist of a tier of councils, the lowest at the Union level of elected representatives, the next at Thana or Tehsil level made up of the Union Council Chairmen together with official and unofficial nominees, with similar councils at district, division and provincial levels. The Deputy Commissioner is Chairman of the District Council with the Deputy Director NDO as Secretary. The Tehsildar or Circle Officer is Chairman of the Tehsil or Thana Council with the Development Officer as adviser. At the Union level the council has an elected Chairman and the Village-AID Worker acts as his adviser. The Village-AID personnel will thus be additionally pre-occupied with the development of these new organs of local government.

126. The Basic Democracies are also clearly an expression of the principle of participation by people in their own affairs and they have been specifically charged with the duty of development. We found a number of different views in the course of our tours as to how they were to carry out this duty which has yet to be defined. Some Union Council Chairmen thought that they

should issue instructions to agricultural staff. Others thought that the Council itself should manage a Union store and issue seeds and fertilizers. Yet others thought that cooperatives should handle these supplies, and where they did not exist or were too small in number, should be created for all farmers with the Chairmen of the Union Council as Chairmen of cooperatives. This would, obviously, identify the elected head of local government with the provision of economic aids, a system which might well have serious drawbacks. Among government officials two main differences of approach were evident. Some thought that the Basic Democracy Councils should have executive responsibility for development using technical officers as their aides. They based this view partly on the belief that Union and Thana (or Tehsil) councils should be the main persuasive influence on farmers, and partly on the belief that to justify the principle of participation one must have confidence in the competence of committees to get things done. Others thought that the councils would be over-taxed if they were expected to handle the day to day needs of development and to see that timely and effective decisions were made and implemented and for this reason felt that their chief role should be to formulate policy.

127. It is not our business to suggest how local government should evolve (and how it should be related to the numerous aspects of development many of which fall outside our competence). We mention these various views because it is against a background of some uncertainty that we have to assess what should be the relationship of a new organisational arm in agriculture to the Basic Democracies. We are convinced on the one hand that the techniques and services which we have elaborated are urgently needed on a national plane. Moreover, we have taken care to present them, not as isolated local or short-term matters, but as a combination of long-term plans which, taken together and pursued with continuity, offer the best ways to increase agricultural production for the nation. We have also suggested that they should be tackled project-wise so that the relevant aspects can be dovetailed together under a project leader in a team manner. Naturally we would consider it

disastrous if plans of this kind were to be imperilled by the whims of local councils. On the other hand we fully appreciate the importance of participation both as a general principle for the future of the country and because without the support and enthusiasm of the people plans for any locality will merely remain dreams. In practice we see no reason why local councils should not enthusiastically welcome the concept of an improved service arm for farmers, or why personnel in that service should not work out the local application of plans in cooperation with the councils. The nation needs both participation and efficiency, and, if they fall apart it would be the duty of the Commissioner and his staff to harmonise them.

The Revenue & General Administration Services

128. The Deputy Commissioner and his staff in a district are members of the revenue service in the western province and general administrative service in the eastern province, and occupy a paramount position quite different from that of any other department. They are a part of the concept of an exceptional cadre of men in administrative control of the country, and their main business has been the collection of land revenue, maintenance of land records and preservation of law and order. With the power associated with taxation, magistracy and police their prestige has naturally been the highest in the land, and they have been expected to operate as the senior service representing the government itself, maintaining contact between government and people, dealing with every emergency and in general supervising anything affecting government in the district. Naturally the revenue service has attracted some men of high calibre and has been accorded a high status in terms of pay and facilities to fulfil its important functions.

129. These functions are executed in the district through a series of posts which, although similar, carry different names in the two wings of the country. In West Pakistan a Collector/Deputy Commissioner is in charge of a district with a Revenue Assistant under him. The district is divided into tehsils, each under a Tehsildar, and the tehsil is divided into several circles each under a Kanungo. Beneath the circles about every 2 to 4 villages are

in charge of a Patwari for the maintenance of records. In East Pakistan a Collector/District Magistrate is in charge with a Joint Collector or a Revenue Assistant under him. The district is divided into sub-divisions, each under a Sub-Divisional Officer, and the sub-division is divided into several circles each under a Circle Officer. The Circle Officer deals with the Union Councils each of which represents about ten villages, as the Patwari system of land records has yet to be introduced there. In both wings, down to the level of the circles, each of these posts represents the head of the district in miniature and carries a corresponding status.

130. There has always been a tradition in the Civil Service (particularly in the Punjab where it is laid down in the Land Administration Manual) that the Revenue Officer acts on behalf of government as the "steward of a great estate", the land being deemed in origin to be the property of the State, and one of the duties enjoined on him is to encourage the development and best use of land. The concept that he should be the leader in agrarian development is thus by no means a new one. Moreover the particular functions which the revenue service perform in connection with land, involving the collection of land revenue, regular recording of crops, registration of all land transactions and settlement of all litigation about land, place their staff at the lower levels in more intimate contact with landowners and farmers than those of any other department. As might be expected from the associated prestige and power, people collect in larger numbers and listen more attentively to a Revenue Officer than to an official of the Agriculture or any other department. For these reasons the Revenue Officer is already often called upon to help in popularising improvements in agriculture, and, when in camp for the purpose of his routine work, to bring home to the farmers who collect about him the importance of increased production. In this latter connection he is also charged with the responsibility of providing taccavi loans not merely fo disasters but for the purchase of seed and fertilisers. Finally, altogether apart from these specific links between the revenue service and agricultural development it is generally believed that to be successful any campaign for increased production must have the support of the revenue service.

131. We mention this background particularly because it explains why the main burden of seeing that something is done about increased agricultural production, which has now become such a national priority, tends to fall upon and be accepted by the revenue service on top of its normal routine duties. It is therefore particularly important to examine how this tendency can be harmoniously reconciled with our own belief in the necessity for a new organisational arm with the sole duty of ensuring increased agricultural production.

The District Team Approach

132. The District Team approach to the problem is the one very generally suggested in the absence of any such special arm but a number of difficulties have arisen in practice which have interfered with effective action in the past. Prominent among these has been the tendency of each individual department to work on its own. The Deputy Commissioner and his staff have often been embarrassed by the fact that, although they are responsible for the general effectiveness of any programme, members of the technical departments are not under their direct control but take their orders from the head of their department. In theory the analogy applied to all is that of the Police which are not run by the Deputy Commissioner, even though he is ultimately responsible for law and order. In practice in the field of agriculture a much greater strain in relationships arises, partly because production has become a matter of daily importance and partly because of the manifest deficiencies which we have already described in so many of the services connected with agriculture. In these circumstances the Deputy Commissioner is often exasperated by the poor quality of the results while the staff of the technical departments, who are frequently older and more experienced in their own profession, tend to feel treated more as inferiors than technicians, and blamed for circumstances beyond their control. These feelings are accentuated when the Deputy Commissioner can really do little to put right the long-term deficiencies and, above all, has little time to listen because he is already overburdened with work.

133. The Deputy Commissioner, in addition to traditional responsibilities for revenue and record of land and law and order, has found his general duties as head of the district continuously expanding as the life of the nation expands. He may be involved in border problems. He has to meet all important visitors. Committees, conferences and paper work have inevitably increased enormously since simpler days. He is responsible for food supplies, famine, flood and medical relief or anything that goes wrong. He is usually president of the district sports committee, head of the district scouts and chairman of the district welfare committee. He is responsible for district boards and municipal bodies. He has to open tenders for supply of food to the jail, to select sites for public health centres, handle town planning and issue licences. He is burdened with increasing litigation on boundary disputes and cattle theft and with the consequences of land reforms. He may be required to conduct elections or to screen unsatisfactory personnel. He has to hear appeals on revenue suits, on rents, on ejectment of tenants, on consolidation, or on allocation of land for refugee rehabilitation which may well involve physical inspection on the spot. Naturally in all this work he has deputies and assistants but he cannot avoid becoming personally preoccupied because he never knows when in respect of any of these issues something may happen which will reflect on his personal responsibility. Today he is particularly preoccupied with the satisfactory evolution of the basic democracies, and with the task of maintaining government contacts with the masses of the people. The same preoccupations at a diminishing level apply to the Sub-Divisional and Circle Officers.

134. Various proposals have been made to get over these difficulties by establishing a clearer line of command and by providing additional personnel. In some cases it is suggested that an additional Development Officer at the district level, with an additional Supervisor or Naib Tehsildar at the tehsil level, both be drawn from the revenue service, to coordinate all development in their respective jurisdiction. In other cases it is suggested that the tehsil should be divided into sectors and the most senior men in the technical

departments appointed as Sector Officers to coordinate and take charge of all development with the advice of local sector committees subject to the general control of the Deputy Commissioner. Under this proposal it is usually envisaged that surveys of requirements would be made in each village and submitted through the chairmen of the Union Councils. The needs would cover such items as bullocks, modern type ploughs, chaff cutters, buckets, and persian wheels, fertilisers, seed, sugar presses, tractors and tube wells, together with the necessary credit. The provision of these needs would then be arranged through the usual channels, all departments cooperating to the best of their ability; the Agricultural Department choosing seed from the best in the tehsil, the cooperatives providing supplies and marketing; the cooperatives, the taccavi and the Agricultural Bank supplying the necessary loans and the Village-AID the general extension.

135. While proposals of this kind may be the best that can be considered for immediate action, there is a real danger that owing to insufficient appreciation of the magnitude of the task, they will also be regarded as all that need be done in terms of organisation to solve all agricultural problems permanently. Departments are very reluctant to believe that any radical change is necessary; and yet from the national view point the most outstanding fact is the failure of production to rise. The mere addition of a few Sector Officers and the streamlining of all authority through the revenue staff suggests a belief that the most important gaps lie only in exhortation and the line of command. Important as both are, emphasis upon them alone does little to put right the inability of present departments to service the farmer adequately with the needs we have elaborated in this report. Village-AID, ally in motivation and participation, cannot supply the farmer with the "five firsts". Agriculture, struggling with extension and supply in one totally inadequate front line service, cannot provide him with better seed and fertiliser on time and in good condition. Cooperatives, ultimate heirs as they should be, need time and education to develop genuine ability to manage loans, supply and marketing, and be an instrument as successful as in Japan or the

Philippines to stop the trader exploiting the farmer. Neither the Agricultural Bank nor the Taccavi system can satisfy the real need of the great majority of farmers—supervised credit against the security of a crop which really has had the "five firsts" applied to it. Revenue Officers, chairmen as they are of district teams which cover all aspects of development at their different levels, cannot divorce themselves from their important duties and become specialists in an increased production programme which needs a full-time dynamism of its own. Basic democracies, which would be consulted on policy, may fall prey to frustration and more futile criticism unless they can rely on an efficient organisation which can help effectively to raise the standards of living of their constituents.

136. Ill-equipped as are the present departments to handle even the "five firsts", there is no machinery at all for tackling the novel problems of changes in the farming patterns. Little has been done yet even to find out by experiment and pilot schemes what to advise the farmer to do. The chief project needs of the country after the "five firsts"—guidance on irrigated and mixed farming in East Pakistan, elimination of salinity in West Pakistan fully organised agriculture in new colonies, thorough testing and management of mechanisation, harnessing of hill streams, conservation of catchments, exploitation of productive regions like Haor and the Chittagong Hills, all these needs remain totally unsatisfied by such small adjustments in departmental machinery as are currently suggested.

137. It is also open to doubt whether it is desirable to put so much responsibility upon the revenue service for streamlining development. It implies that those officers alone, and all of them, have a special managerial capacity for a job outside their routine work which often requires qualities not necessarily identical with those needed for the civil service. The subordination of technicians and scientists to the generalist administrator is already a problem in the country. In the period ahead when the nation is striving urgently to "take off" towards higher standards of living, the contribution of science and the application of technology will, as in other countries,

be of critical importance. The time has come to move away from, not to revert back to, the old concept inherited from colonial days that the technician is inferior to the administrator. There is a tremendous need for opening up the avenues, encouraging the individual creativeness of technicians, and appreciating the vast field of new specialisation which the problems of agricultural development demand. Confinement of these new problems to time-worn channels, already conspicuously sluggish, may cost the nation its creative power.

138. Agricultural development is not necessarily different from other forms of development. Traditional reasons for tying its future tightly to the revenue service may have other drawbacks in an age moving away from paternalism. Already much of the litigation in rural life arises from judgements of the lower ranks of the revenue service. To give them also, on top of taxation and law and order, the responsibility for the supply line of agricultural life implies a heavy concentration of power.

139. In advocating for farmers a service organisation emancipated from the tight control of the revenue service we are not insensible at present that the latter service has a vitally important influence on the public. For most people the Deputy Commissioner and his staff are the government. At the same time it must be recognised that in tackling the problem of agricultural development there is a great and vital void unfilled by any department. In this situation the revenue service should welcome the creation and evolution of an alternative instrument to handle the specialised aspects of agricultural development efficiently, and to take a large part of the burden of responsibility from their officers. The revenue service together with the basic democracies would still provide the means for coordination with other development programmes and provide general support and assistance to the specialised organisation particularly when resort to order is needed. The fear that the creation of an efficient instrument for agricultural development runs contrary to the democratic objectives of basic democracy is, we believe, erroneous. Both objectives are needed. Participation in self-

management is vital but an effective solution to poverty and hunger is equally vital to give participation any meaning.

140. There is a risk that any new organisation set up to fill the void will incur the antagonism of all existing departments, as an empire detracting from their own importance and provided with facilities which they have always lacked. We would strongly express the opposite view that this is really their common instrument and not of one department alone. In execution, it must often be a blend that forms the team in a project, and will present a common strength in aspects which they lacked individually. It will work together with them in a national endeavour which otherwise would have only dim prospects of success. We visualise that the staff for such an instrument may be drawn from any department and from a wider field, handpicked above all for ability to get on with those problems which hold back farmers from increased production and increased incomes.

Some General Considerations about Government Services

141. We have proposed an action organisation devoid of the deficiencies of the present government departments. We have now to consider whether it can carry out an action programme of the nature needed within the present general conditions of government service. First we must recapitulate the nature needed. It has to carry out the main proposals on technical aids for increasing production, but not everything and not all at once. Such subjects as land tenure, flood control, canal water supplies and roads, all vital in their effect on production, would be outside the scope of the new organisation, but with the remainder we envisage that in selected project areas, the respective departments would relinquish to the new arm the agricultural action aspects of their work, their remaining tasks playing an integral but separate part as an ally in a common campaign.

142. We visualise that the Agriculture Department will cede extension and supply but retain research. This implies a break in what ought to be a continuous process but care is needed not to overload the new arm and impede its primary duty of getting results at the end. As already described,

research is in such a bad way generally in the country and the position of science is so important that we make special suggestions later on this subject. There must be close contact between research and the new arm and in special cases it should be able to contract for its own research. The plant breeder must know the needs of extension and work to satisfy them conscious that the new arm is waiting equipped to multiply and distribute new varieties. The research stations must discover the right rotation in mixed farming, the water needs of crops, the right follow-up for salinity control, the appropriate fertiliser, the best grasses for the range, the suitable fruit trees, vines and vegetables for the hill catchments, the most successful insecticides, the best breeds and crosses for animal husbandry The list will be endless as a real two-way traffic between research and extension develops. The research station must have also variety trials and outstation plots in project areas. It will be for the new arm to pick up and apply the discoveries in its own areas of operation.

143. We visualise a similar relationship with other departments. The Veterinary Department would relinquish animal husbandry and concentrate on much needed disease control, aware that the new arm would at last be taking steps to cure the farmer's chronic problem of fodder. The Cooperative Department would be relieved of the hopeless prospect of trying to run the whole country's supply and marketing with inadequate resources. It would specialise in disseminating its own philosophy, ready to take over from foundations in organised agriculture which the new arm would have already laid. Village-AID would relinquish its claim to be the sole extension service, aware that the new arm was designed to carry through far more than demonstration, and ready itself to make an invaluable contribution as a forerunner in motivation, while superfluous staff of the NDO, who felt more interested in active agriculture, might join the new arm.

144. With the boundaries thus set out, some outline of the nature of the new arm's work is needed. The general objective is, as with all proposals for increased production, to get away from departmental isolationism,

establish overall disciplinary control and enable inter-related subjects, at present divided, to be regrouped as required under one command. First the supply line must be set straight. Specialist staff must take over the foundation farms, develop registered growers, and ensure that production on business lines does bring the farmer better seed. Suitable storage must be built close to the farmer and staff provided, in addition to the extension service. In this supply work, a large degree of autonomy and the application of commercial standards will be essential.

145. With this background, a different type of extension service must be provided, going beyond mere demonstration. It must provide, in the first instance, the "five firsts" and later on, in particular projects, their own appropriate techniques. There must be an office, next to the store, and necessary facilities, status and training given to the front line staff to enable them to do an advisory and supervisory job with confidence. The numbers needed will depend on the degree of detail demanded by the project, but for the "five firsts" the staff and facilities provided in the Village-AID set-up are an example. The men must be carefully selected. There will be need at various points and in different projects for specialists, civil and mechanical engineers, accountants and men trained in business-management, scientists skilled in different aspects of agriculture, and animal, forestry and fishery experts. But, for the bulk of the job much will turn on the quality and aptitude of the front line staff to get farmers to get on and to get on with them. That all should be graduates in agriculture as well, is an ideal for the future, but the graduate in collar and tie who sees himself ill-served if he is not at a desk in city surroundings like his colleagues in class who took other subjects, would be a misfit. The criterion of merit and pay should not be a degree, although specialist education used aright should always add to a man's value. Front line staff should be men who like to work in the open air, and can do with their own hands what they are telling the farmer to do. Continuity in the post will be important to gain farmers' confidence but, as in the army, each front line private should carry in his pocket a potential

field-marshal's baton. There should be no bar to promotion for the man who can get things done.

146. In each project area, taken over by the new organisation, there must be a team leader chosen for his ability to fill that post whatever his background and seniority, and all staff in the new arm must come under his authority. The analogy in our minds is of a war footing. To break through to victory the need is for a new continuous, coordinated and specialised effort. At the base must be an organisation with business efficiency yet with men of vision and imagination, able to exploit the many opportunities and accept the challenge presented. In the front line must be a cadre of men living among and in daily contact with farmers: their characteristics, activity and drive, sympathy without softness, capacity for leadership, commonsense, integrity and dedication. It must be their job to make the farmer succeed: their opportunity to be the most important creative force in the nation: their risk to be fired if they do not fill the bill.

147. To achieve success concentration in selected project areas will be essential. In certain productive districts the proper use of "five firsts" must be introduced; and, when that is established, progressive addition of other aspects should follow; in certain other districts a beginning must be made in the solution of many special problems already described; and over the country as a whole, as quickly as can reasonably be done, a new supply wing and adequate storage for better seeds, fertilisers and plant protection materials provided. But it would be disastrous to dissipate inadequate resources too widely and so fail to find the effective means for gradually lifting up the whole country. When success is achieved the war footing could cease, cooperatives replace the managerial organisations, private enterprise compete to provide supplies and extension revert to an advisory position. When that happens the new arm will have served its purpose.

148. Unfortunately there are aspects of government service which are particularly at variance with most of these objectives, and a difficult dilemma faces the country. In the undeveloped state of the country, government itself has had to be the initiator and controller of development. It is

not merely that there must be a Planning Commission ultimately determining priorities and evaluating progress, and there must be strict control of expenditure and foreign exchange. For want of an alternative the actual work of development has fallen on government departments. But the government machine was never designed for development and most of its traditions and regulations operate to prevent it from becoming an effective instrument for that purpose. Its administrative outlook is that of the giver of law and order, the seat of balanced judgement, the arbitrator of other men's activities, and not that of a go-getter and an efficient business machine. The traditional outlook has values whose continuance is of advantage to the country and it may well be better that government itself should remain the stimulator and arbitrator rather than the active developer. Moreover a system designed to keep the present machinery of government running smoothly, to collect revenue and safeguard government funds, is not easily adapted to handle revolutionary changes in development which need a full time attention and a different outlook. There is, therefore, inevitably in the government machine a certain resistance to change, and the structure reflects the historic emphasis on a cadre of senior officials mainly concerned with revenue collection and law and order, with the new concept of development tacked on but not accorded proper status or money. From the point of view of development this results in serious deficiencies particularly in relation to planning, finance, supplies and staff.

149. At the top, the allocation of funds to the agricultural sector of the economy is not commensurate with public proclamations of its importance. This is partly due to the absence of any long-term outlook. Planning is based on individual schemes and the need to meet immediate problems rather than on a total picture. This unplanned grafting of new activities on to old organisations leads to overlapping, diffusion of one subject among different departments instead of the whole subject being a one-unit responsibility. It also leads to incomplete budgetary preparation. A project may be proposed without financial provision for research, survey and training upon

which its successful running will depend. A dam may be sanctioned but not the provision for the agricultural follow-up which alone justifies its creation. Within the department's plan there may be a plethora of coordinating processes in detail but no coordination of main functions. A colonisation plan preoccupied with settling people may have insufficient provision to boost their future incomes. A cooperative credit plan may omit any reference to agricultural supervision. A central plant protection proposal may ignore the potential contact with the front line field staff. A soil conservation plan may investigate the best grasses but have no provision for application of this research which may be a matter for the forestry department. Ex-officio boards have been created to reduce departmental isolation but in such committees of busy officials each has vested interests in his own department and they tend to be post offices for projects rather than creators of balanced planning.

150. Even after planning, the slow tempo of the government machine makes it extraordinarily difficult to get any quick decisions. The inherited system is full of regulations designed to stop officials at the periphery from making mistakes embarrassing to government. Every proposal, although it may have been examined by expert technicians in the department, has to pass up a line of secretariat officers until approval is given at the top. Appropriate enough for decisions requiring the detached judgement of a generalist in more leisurely days, in the rush of today it means frustrating delays, and in many cases decisions by junior officers ignorant of the technical problems and far from the scene of action. As one foreign expert, anxious to promote an urgently needed hybrid maize project, put it "Everything has to be referred to Lahore and Lahore, though only 276 miles, is months away". Schemes approved at the departmental level lie ages in the secretariat without further action. With such a system at the Centre retension of authority becomes a habit. Ministries are reluctant to delegate power of decision to departments and departments to their project officials. Those at the top instead of confining themselves to coordinating objectives tend to

control all the details of programme operators down below. The dynamism so badly needed in the front line is extinguished.

151. These conditions particularly pertain to finance where past regulations have been made more for the avoidance of loss than the promotion of development. A system of checks and counter checks, designed in a poor country to prevent inexperienced personnel from overspending or misappropriating funds, has naturally centralised all authority and left no one able to make even simple financial decisions on the spot. We have already illustrated some of the adverse effects of this high degree of centralisation on seed production and on timely ordering of fertiliser. Many other instances will be known to members of every department. While clearly particular care has to be taken over finance, in the projects we have enumerated the losses to the country from avoidable and damaging delays and inflexibility may greatly exceed the losses from dishonest and incompetent officers, and we think it essential that the team leader in charge of a project be trusted and given all necessary authority for efficient work.

152. But a more subtle drawback of the present system is that it develops an attitude of mind at the Centre which regards a budget as a plan for control rather than a plan for facilitating development. Parsimony and economy tend to be exalted as virtues and haggling over expenditure made more important than real control over effective use of funds. These conditions have been accentuated by two other features connected with the budget, the habit of including round figures in budget estimates for projects whose full financial implications have not been anticipated, and the very long delay, now up to three years, before audit can be expected. The whole situation results in a system of pre-audit which, even when the budget is passed, requires further individual sanction for each item of expenditure making an excess of checking before action and little of any effect after. In today's plunge into development the controlling and approving staff often lack the specialised knowledge, and experience outside mere audit, to give balanced and correct judgements and this leads to interminable queries and continuous delays.

153. These financial bottlenecks also permeate the procurement of supplies. Centralised ordering through the Director General of Supplies & Development naturally has advantages for the same reasons of economy and uniformity; and before needs of development became urgent had no doubt few off-setting disadvantages. But for a project requiring quick and particular deliveries the matter is otherwise. On our tours we found projects where, after extensive trials, certain makes of tractors, although initially more expensive, were far more productive in hours worked and spares saved; yet, an indent for these makes was rejected in favour of a cheaper make already tested and found unsatisfactory. Similarly an indent for spares from the makers was substituted by spares from open tender, which proved inferior in quality and far more costly in terms of durability and repairs. At another place we found new tractors standing idle for lack of disc ploughs which were not ordered at the time when contracts for the tractors were placed. Long delays occur because each application for sanction is first examined at the lowest level, and then through successive ranks of officers, who are not conversant with exact requirement and the local situation. Again, questions are asked about details, supplies do not arrive in time and delays often cause far greater loss than are obviated by the scrutiny.*

154. Of all the factors in development probably nothing is as important as the morale and quality of the staff. These are closely affected by the quality of the leadership and its capacity for maintaining intimate contact with the staff. The maker of policy should be concerned with executing it. One of the drawbacks of government service, as far as development is concerned, is that the secretariat system separates policy making from administration. It also separates apart a special cadre of administrators who by

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*Considerable changes have been made in financial decentralisation and in the existing methods of according financial sanctions to schemes since this para. was written. It is difficult for us to judge the effectiveness of these changes as they were introduced only on 1st of September. There is no doubt that they represent a very considerable improvement, but, in our view, the desired effect of the changes will only be achieved if full delegation of powers right through the organisations is ensured so that delays are eliminated.

virtue of passing an initial examination qualify for higher status and pay than others. An economist, a commercial adviser, an agricultural scientist, or even a competent administrator of a project who has not passed into the cadre, cannot qualify for a post of equal status regardless of his subsequent performance. There may be a virtue in government retaining an exclusive cadre to attract young men of the highest intellectual and moral character for those posts which represent the power and responsibility of government itself as opposed to the ordinary run of the market place, but in development it has a stratifying effect and impairs the principle of equal opportunity which is so vital to morale.

155. The stratifying effect is increased by the very high respect paid to seniority in questions of promotion and, equally, at the other end by the difficulty of disciplining or dismissing civil servants who are found wanting. Ability and merit are not easily rewarded and inefficiency is not easily penalized. For the harmonious continuity of the processes of government stability of employment and orderly progress in one's job may have advantages, but for development too much security and not enough incentive risks ending in mediocrity, low output, and high administration costs. There are other drawbacks to the personnel traditions in government service. The stratification and the seniority principle make frequent transfers of staff almost unavoidable irrespective of the damage this may do to a project in progress. Changes may be desirable for unsuitability or because individual officers are not trusted to resist local influences, but generally speaking, in the agricultural development which we envisage, continuity in a post will be of critical value. A man should be able to become thoroughly acquainted with an area and its problems, so that the local farmers may get to know and appreciate him. Reward and promotion without the need for transfer may be highly desirable in the interests of the project.

156. Finally, in government service, staff, like supplies, have to be centrally ordered. All recruitment has to go through a Public Service Commission, posts have to be advertised and initial terms of service related

to the educational and other requirements pertaining to the general grade into which the posts fall. Under these conditions it is difficult to pay a man his market value and in accordance with his experience and personality. As with supplies, the system involves unduly long delays and choices made by people remote from the scene of action.

Agricultural Development Corporation

157. No one would deliberately choose such handicaps when setting up a new instrument for development and we have, therefore, come to the conclusion that the new arm must be established outside the channels of routine government services and as an autonomous body. The decision is a difficult one because, unlike the PIDC, the field is not entirely a new one. Bits and pieces of a great many of its proposed activities are at present tacked on under the wing of one department or another. Nevertheless some controlling organisation is required to put these bits and pieces together so that they form a coordinated pattern for the evolution of a project until it is successfully concluded. It is required also to add those missing elements which no department at present is handling, and the coordination and the new elements are required together to fill the great void in effective agricultural development to which we have referred. To do its job properly such an organisation must be free to make its own comprehensive plans, to draw up and control its own budget, to decentralise authority to its own project staff, to order its own supplies in timely manner, and to choose, promote and get rid of its own staff.

158. We are aware that proposals have been made to improve the government procedures but these mainly take the form of new inter-departmental boards and decentralisation of authority to Commissioners and Deputy Commissioners of the revenue service. While we have no doubt that such steps may lead to improvement in the overall planning of development in a district, (and there are many aspects of development which fall outside the purview of our proposed organisation) there is, for reasons already explained, a vital need for one organisation to be solely responsible for ensuring

that the farmers' production and the farmers' incomes are raised. Proposals for patch work improvement and better coordination of departments do not provide for this need. The alternative of leaving the present departments to do the best they can with merely increased staff and status, in spite of the handicaps of government service in relation to development action, has the attraction of causing less disturbance, but has the drawback of missing just that element of package deal and project compactness and thoroughness which we believe to be the biggest factor in potential success. The alternative, sometimes suggested, of separating off merely the supply of seed and fertiliser on the grounds that these are services which should be run commercially, falls short of the requirements for the same reason.

159. To the cry "what? more corporations?" our answer is "yes, precisely", because the increasing tempo of development demands better instruments to handle it, instruments which, were people richer and the country more developed, they would themselves create, but which, in the gravity of today's problems of high population, low yield and tiny incomes, the government must provide. There is no reason to confine the solution to present departmental channels just because they happen to be in existence. Agriculture has in many parts of the world been regarded as a way-of-life in which efficiency is simply a matter of the farmer's choice, aided by a little departmental advice. Agriculture in Pakistan today is the nation's most vital industry, the biggest earner of foreign exchange, the most important activity in achieving higher standards of living. Its efficiency matters to every man in the country. We have made clear how strongly we believe that organisational and managerial elements must increasingly be brought into the agricultural life just as they are vital elements in industrial life. But these are elements foreign in many ways to the traditional outlook of departments dealing with agriculture and ones in which they are conspicuously weak. A corporation has the advantage that it can put efficiency in the fore-front of its objectives. A deliberate preference for purely departmental solutions would forfeit this great national need.

160. There may be fear that a corporation might act as a kind of super-authority. We do not hesitate to say that landowners and farmers must be impressed, far more than has been the case in the past, with the duty they owe to the nation to make the most productive use of land, and we visualise that all organs of government will be enlisted to make this clear. We also believe that there may have to be regulations covering any form of ownership or tenure which require compliance with certain standards, just as such regulations had to be introduced into the United Kingdom during the last war. Again, there must be certain areas where new methods of land usage, such as uniform crop rotations, zonal cropping, or block systems of management, may have to be introduced and made obligatory, because they form a far more satisfactory basis for modern productive methods than those now in use. But we anticipate that all such regulations will be introduced by the government itself on a "declared area" basis, and only after experiment and demonstrations have made people acquainted with their value, so that they appreciate them not as arbitrary orders but as the technical requirements for a higher standard of living. Certain requirements with respect to land consolidation and crop sanitation may also have to be enforced so that an individual will not be permitted by his own inaction to affect adversely the prosperity of his neighbours or of the nation.

161. The corporations will of course be involved in the initial experimentation and application of many of these matters, but it will be operating under regulations laid down by the government itself and enforced by the ordinary machinery of government. We do not envisage the corporation as the boss. We conceive of it as the instrument which can create for the farmers the technical conditions which will enable them to fulfil their duty to the nation and raise their own standards of living. We picture it in action not so much as a bureaucracy as a service, enabling farmers to stand more securely on their own feet both individually and collectively.

162. It may be feared that the corporations will undertake too many tasks,

or that it might become too independent. Some people, who have these fears but see the need for the package deal and project approach, have thought wiser to have no corporation but rather a series of independent projects with their own isolated teams. We do not share this view. Such a proposal may too easily remain in the departmental committee level with all the drawbacks of existing government service. Moreover, we feel it important that this crucial agricultural development task should be carried out by an agency with an identity and sense of dedication of its own, capable of adopting procedures which will be free of red-tape and will be headed by an outstanding personality with prestige and authority. We do not envisage an inter-departmental committee of part-time officials. The essence of the operations will be decentralisation to the project, but we do envisage a small full-time board of control.

163. There might be an objection that the corporations might become a super-authority, indulge in extravagant expenditure and get beyond budgetary and planning control. Anxieties over certain development corporations have prompted such criticisms, although it is reasonable to wonder whether the offsetting progress made by the creation of these authorities would ever have been achieved had the matters been left to routine departmental ways. Smaller expenditures without any comparable effect might have been more wasteful. We see no reason because of the risk of extravagance to prefer a solution by departmental methods. Risks have to be taken in adopting any new approach, but the biggest risk of all facing the nation now is that of standing still. The difficulties encountered by the departments in the past convince us that the risk of continuing along the old lines is much too great. The corporations must, of course, be subject to adequate public control and financial checks to prevent it from being extravagant or exceeding its jurisdiction. The corporations must be free from bureaucratic controls, and enjoy the advantages of business management, flexibility and freedom in implementing its programmes; but its purposes should be clearly defined, and its programme as embodied in an annual budget (but not the day to day

administration) must be approved by government. Naturally there would be provision for reports and audit. Apart from this, there seems no reason why the corporations, ridding themselves of the pre-audit system, should not adopt in its place a far tougher insistence on adequate budgetary preparation in each of its projects, as well as a quicker external audit and a better evaluation of the results of its expenditure than is customary today in government departments. Planning by project and the adoption of such budgetary improvements should assist rather than hamper national planning and national financial control.

164. We would like to refer again to the fear that the creation of such corporations may detract from, rather than add to, the field of operations of the basic democracies. Since such an objection is seldom raised in connection with industry or with the Railway Board, the Posts & Telegraphs or WAPDA, there seems to us no special reason why it should be a matter of concern in the case of an agricultural corporation. To subordinate agricultural development entirely to local councils would be to disparage its enormous national importance, and to deny farmers the help that they could get from a corporation run on business like lines. We envisage rather that the basic democracies will be concerned with development as a whole and as it affects a locality, and that the corporation will accordingly work with the local councils and particularly invoke their assistance in getting the cooperation of the local farmers.

165. One of the most difficult questions, when any new body is set up, is the recruitment of staff. In order to reduce expenditure there is a great temptation to rely on instruments like cooperatives or Basic Democracy Councils, or Village-AID because a great deal of voluntary work is hereby obtained for nothing. We do not underestimate the value of the self-help contribution, but as an addition, and not as a substitution, for an effective cadre for implementation. There can be too much emphasis on the fear that excessive costs will be incurred at the front line. A country wanting development must invest in staff to do it. What is essential is an effective result,

for then the increased production means foreign exchange saved or earned, and employment benefits throughout the country. We have already emphasised that the present position reflects an expensive superstructure with no effective personnel or organisation at the point of implementation.

166. Experience has already disclosed some of the difficulties which arise when a new body has to be fitted in. Undoubtedly it can be an irritant. It has to recruit good men from existing government departments for lack of them elsewhere. It must often offer them more attractive terms which disrupts existing services, or cannot get them because of fears of loss of promotion and pension, or because the job involves harder living conditions. Its very creation is apt to alienate existing departments who may tend to refuse to help. It then gets out on a limb on its own, solving its own needs at the cost of some duplication to the country, and has no sympathetic contact with departments which in the nature of things continually cross its boundaries. It may lack the authority of government to get things done and the advantage of patronage. These various difficulties are not confined to the concept of a corporation. NDO and Village-AID, as we have noted, have caused envy and suffer from isolation owing to the better facilities they have been given. They have also drawn from the Agriculture Department some of their best personnel as well as many agricultural graduates. Even the plant protection service by paying Rs. 10 more to the same category of men, has taken many of the field assistants away from agriculture.

167. Nevertheless, we deem it extremely important that departments most closely connected with rural life should, as we have suggested, look upon the proposed Agricultural Development Corporations as something arising from and representing themselves. Its work in fact will be as much concerned with converting existing jobs into a combined operation as with new jobs. Naturally in such situations much turns on individual personalities but there is a damaging tendency in the country at present for each department to try to expand its own individual contribution and to lose thereby the much

more effective contribution which coordinated and unified action can make. We consider that instructions should be given that all departments must cooperate with the corporations and supply it with seconded staff and facilities when required. We appreciate that in certain instances this may mean depletion and weakness somewhere else, but this must be accepted. It is impossible to improve all the country all at once. It is essential to stop dissipating resources and concentrate on discovering the best methods for increasing production and then gradually extending them. In this connection we want to emphasise that the corporations should not tackle the whole range of its activities at once and will need to work according to priorities which will be discussed in greater detail in the following chapters. But as a matter of principle, we do not think it desirable to lay down in advance an exact order of priorities. In the projects themselves there will be need for flexibility. Only when facing the issues in the locality should such matters be decided and even then they may well need adjustment in the light of experience.

168. We do, however, anticipate that the corporations would have certain marked advantages in recruiting and compensating its staff which more than offset the difficulties already mentioned. It should be able to call on any suitable men and pay salaries or bonuses which are related to the effectiveness of a man's work. It should be able to provide greater continuity of employment in individual posts. It should be able to recruit retired personnel or capable young men frustrated in their present employment by the insistenc on seniority in promotion. The danger of depleting existing services should not be exaggerated. The particular nature of the rural job in the front line has by no means a general appeal and as the requirements are to some extent dependent on personality rather than on academic qualifications the field is not confined to the few graduates available. Moreover personnel who do join from the Agriculture Department, NDO, Cooperatives or Animal Husbandry are likely to be active types who will be much more effectively used in the Agricultural Development Corporations, offering greater

possibilities of doing an effective job in agricultural production than their present departments.

169. The corporations should also be able to bring in specialists from outside the ordinary line of government, army men experienced in the Army Service Corps for organising the supply wing, commercial men for marketing and processing installations. It can bring in foreign experts from commercial seed firms to reorganise the seed production system. The Corporations should find it easier than the Government departments to recruit foreigners when competent local men are not available, just as PIDC has recruited personnel from Europe and Canada in the mining, fertilizer, cement and paper industries, to undertake management responsibilities or to train men and pass on better techniques to the country, and just as the Army Sugar Mill in the G. M. Barrage has recruited a Philippine expert to improve cane varieties. Finally, although it may lack the authority of the revenue service, absence of any connection with police and taxation may be a positive advantage to an organisation which must build up a respect based on the value of its own service, just as the Tennessee Valley Authority has done in the United States.

170. When we look back on the survey we have made the country's urgent need for increased agricultural production, the sombre picture of the farmer's condition upon whom the nation must rely for that increase, the large potential for higher output if proper techniques are applied, the weakness of the present tools for the job and the stark fact that at present their effect is negligible - then we are made very conscious that, although all services of government must put their shoulders to the wheel, some new motive power for implementation must be found. The corporation solution has drawbacks, and its value could certainly be greatly reduced if important individuals and departments simply do not want it to work. But this is a risk which we believe must be run and minimised as far as possible. Departmental alternatives seem to us to offer far less prospect of success, and unless there is success in increasing agricultural production, progress in other fields of development will be very difficult to achieve.

171. There is one final important advantage in having an organisation especially designed to be an efficient instrument for increasing agricultural production and for tackling consistently and in a series of projects the gradual implementation of a long-term policy. Pakistan is very dependent on foreign aid, the purpose of which is to help it to develop its own resources and be free of such dependence as soon as possible. At present much of the foreign aid, whether from United Nations, Development Loan Fund, ICA, Colombo Plan or other agencies, is devoted to isolated projects which may be important in themselves but would be vastly more effective if they were part of a combined operation pursued to a productive conclusion. The creation of a special organisation, assigned to make a thoroughly efficient job of putting the country's agriculture in a satisfactory condition will, we believe, give also a special opportunity for foreign aid agencies to do a far more effective job. In the different project areas there will be call for help in money and in specialists, and there will be opportunities to financing individual items with far more assurance than in the past that they may achieve the real purpose of the aids-self management without aid. We believe that the whole value of foreign aid would be considerably enhanced by utilisation of these opportunities.

172. In our succeeding chapters we examine in greater detail the nature of the proposed Agricultural Development Corporations and we give consideration to those other matters of national policy which lie outside its scope but have great bearing on the farmer's position.

PART IV

RECOMMENDATIONS

CHAPTER 7

AGRICULTURAL DEVELOPMENT CORPORATIONS

Functions & Scope

Recapitulation

In the last chapter we went at length into the reasons which compelled us to accept the necessity of a new organisation to bring about a revolution in Pakistan's agricultural economy. We will have failed in our purpose if we have not established that potentialities for increasing agricultural production in this country are very great and that unless they are properly exploited, higher incomes and economic viability are not possible. We must re-emphasise the point that each individual farmer is like an industrialist and that the job of increasing production has to be done by him and not by government. He is, however, in no position to do it unless the necessary tools are placed in his hand. The government, therefore, have an urgent and immediate responsibility for providing these means.

2. We gave reasons for our conclusion that the existing departments and organisations of government were not in a position to assist the farmer to the extent of his needs. We found that attempts at providing assistance through a district team approach, or through a concerted effort as contemplated in the recent Model Scheme of the Ministry of Food and Agriculture, were also open to objections. The district team approach depends almost entirely on close supervision and personal leadership by the district officer. We have shown that this officer is far too heavily overburdened even for his existing duties. We cannot see how the appointment of an assistant to relieve him of his present work would reduce his personal responsibility. The same difficulties would arise in the case of the Model Scheme which equally depends on the initiative of the same officer. In its field work, it depends for supervision on officers of departments, other than agriculture, and thereby loses the advantage of technical knowledge. It over-emphasises paper work to the detriment of intimate and continuous contact with the farmers and under-estimates the manpower

required to do so.

3. We concluded that a solution must be sought outside existing organisations. We are alive to possible dangers arising from over-centralisation, from the jealousies of departments and from financial licence. We felt that risks are inherent in any steps that are taken to bring about such vast changes in the thinking and action of millions of tradition-bound illiterate farmers whose means are limited and whose knowledge is outdated. We came to the conclusion that the need for increasing production is so overriding that some risks must be taken. Such risks can be minimised through efficient administration and careful planning; but production cannot easily increase without the type of organisation which we have thought it necessary to recommend. We have, therefore, decided to recommend that a new organisation be set up which should be effective, comprehensive enough to make an impression on the farmer, big enough to be a force in the highest counsels of the nation, should have resources which permit the development of a programme matching the immensity of the problem, and flexible enough to meet the variations inherent in the panorama of Pakistan's agriculture.

Creation of Agricultural Development Corporations

4. We cannot foresee the future constitution of the country. The present arrangements place the responsibility of the execution of projects on the provinces. We see an advantage in the avoidance of excessive centralisation in a country where the two provinces are so widely separated and where each wing has its own problems. We have taken into consideration the fact that the large Water and Power Development Authorities (WAPDAs) are situated in the provinces. We have therefore decided to recommend that an Agricultural Development Corporation be established in each province to undertake the task of increasing agricultural production and the income of the farmer. It is our intention that such an organisation concentrate, above all, on an integrated front-line service to the farmer which has hitherto been so conspicuously neglected. It is our purpose

that these Corporations should have within their scope the provision of all the help that is needed by the farmer.

Government & the Corporations

5. While the two Corporations should be situated in the provinces, we consider it essential that financial backing should come directly from the Central Government so that their programmes are not hampered by lack of funds, which would be inevitable if they were to depend upon the somewhat meagre resources of the provincial governments. We are not competent to devise an enabling legal formula, but we are convinced that assurance of ample and continuous financial backing is vital. Subject to this proviso, the question of whether administrative control should rest in the Centre or in the provinces is not important from our point of view. We do not doubt that the Central or the provincial government will exercise normal powers of supervision over the Corporation as it is doing in the case of the PIDC or the WAPDAs, and that this control will mainly come through budget approvals and the calling of returns and periodic reports. We assume that the capital needed by the Corporations will come in the form of grants and loans from government. We suggest that the finances needed for the procurement, production and distribution of supplies, buildings and transport, and the expenses of administration together with necessary foreign exchange, be made available annually in accordance with the programme of the Corporations. We further suggest that the cost of any subsidy be borne by government and the Corporations be allowed to retain any income received by them to enable them gradually to operate commercially. It must be clearly understood, however, that the Corporations cannot be expected to earn profits. Their promotional activities should yield big 'dividends' to the country in the form of higher output, but their activities will need continuous financial support. Substantial sums will also have to be provided by government for the credit operations of the Corporations. The total financing required can only be determined after they have been established

and have drawn up their action programme together with a realistic assessment of their financial requirements.

6. While the two Corporations will work independently, suitable arrangements for liaison between them is desirable, so that the experience gained by one can be utilised by the other, and common action planned on matters of common interest. The provincial nature of the two Corporations would mean that the two federal areas of Rawalpindi and Karachi will be excluded. We recommend that these areas become a part of the West Pakistan Agricultural Development Corporation and take the form of two separate field projects under it.

7. The two main functions of the Corporations will be to organise supplies needed by the farmer and to provide him with technical knowledge which will enable him to change his methods. We, therefore, recommend that each Corporation should have one Supply and one Field Wing to fulfil its twofold responsibility.

The Supply Wing

8. The task of the Supply Wing will be to produce or procure, transport and distribute seeds, fertilizers, plant protection materials and farm implements throughout the country. The Corporations will have to build suitable depots in each Union. The Union depot should have sufficient accommodation to house these materials and field offices, and, if possible, to provide a meeting place. Later on, it may be necessary to house the field staff of an engineering division and to provide accommodation for the warehousing of farm crops. Apart from the sale of these materials, it is our intention that a large part of these supplies should be advanced on credit and that credit should be supervised by the Field Wing to ensure its proper use. The depot will also become the centre for the hiring out of agricultural implements and tractors. In view of the urgent nature of the problem and the need for the spread of supplies throughout the country, we recommend that the Supply Wing extends its operations all over the country as quickly as it can. Its first attention, however, must be devoted to those areas where the Field Wing will start operating.

9. It is our intention that farm supplies should be properly organised by the Corporations so that an efficient organisation is built up. After this has been done, the Corporations should, wherever possible, work for a gradual transfer of this business to private or cooperative trade. We have not been able to recommend that private or cooperative trade be brought, at the present stage, into the arrangements we contemplate, as we consider that cooperative management acumen does not as yet hold out a hope for significant improvements, and private trade might carry with it the danger of monopolistic abuses and of such malpractices as adulteration and short-weight. We also believe that the initial volume of supplies at many depots will not be large enough to be commercially profitable and that private enterprise may neglect the important promotional task of making supplies available everywhere. Above all, we consider that at a stage where supervised credit has to be introduced, it is necessary to bring supplies as well as supervision within the orbit of a single organisation.

10. We have commented adversely on the present state of seed farms and cattle breeding farms. To improve them the control of these farms should be transferred to the Corporations, and we recommend accordingly. This is a specialised task and will require specialised staff.

The Field Wing

11. The need for experimentation, for training personnel and the existence of a number of special problems necessitate a phased programme for the work of the Field Wing, which should operate in selected Project Areas. The size of the project area will depend on the circumstances and the nature of the problem or problems to be tackled. It may range from a small project area to a larger area covering more than one district. We recommend that such an area be notified as a 'Project Area' by the government on the recommendation of the Corporations.

12. The first task of the Field Wing will be to ensure the intensive and coordinated use of the 'five firsts' including supervised credit. Its second task will be the solution of the special and more complicated

problems of land reclamation, range management, soil conservation, irrigation management, organisation of agriculture in new colonies, harnessing of hill streams, conservation of catchments and exploitation of potential areas. The third task will be to introduce planned agriculture through suitable crop rotations and mixed farming. Organisation of marketing and processing, and the creation of the cooperatives will follow. The final function of this Wing will be to reorganise small farms through cooperatives or through large blocks for joint planning. While in places these tasks could be phased in this order, in others they will either overlap or take a different order of priority.

13. After an area has been selected, it may be necessary for the project staff to organise the intensive use of the 'five firsts' throughout the area and to apply other methods in only a part of it, extending them gradually. In some situations, as in the cooperative farming societies of the Punjab, it may be possible to move straightaway to farm management, taking advantage of the existing structure of the societies. The individual programme for each project would, therefore, have to be worked out independently after a proper survey.

14. We will enter into a detailed discussion of the type of work the Corporations will have to perform through their operating wings later in this chapter. We wish to point out here that the start of work in the Corporations will depend not only on the assurance of financial backing, but also on the availability and adequate training of staff and on proper surveys of the local situation. The Supply Wing can start operation quickly, but an exact assessment of necessary supplies will have to be made and depots built. In the case of the Field Wing, work must start only on a few selected projects and then only after proper assessment of the situation and the training of staff. We consider this to be a matter of considerable importance as quality and concentration are important if good and lasting results are to be achieved. We have elsewhere suggested, the expansion of work in non-project areas through the existing departments, in such

aspects of agricultural production as can be taken in hand without elaborate preparations. The Corporations should move into the job well prepared and should not incur the risk of failure. On the other hand, we recognise that the need for increasing production is so urgent that the Corporations will have to take on the full range of their functions as soon as finances and the supply of trained staff permit.

Recruitment & Training

15. The recruitment and training of staff is a matter of vital importance as the success of the enterprise will depend primarily on the quality of the field staff and on their training. The requirements of each project will differ widely. The task of organising proper training, therefore, will be a complicated one and we contemplate that the Corporations will take advantage of whatever training facilities exist in the country, create further facilities where they do not exist, and take advantage of advanced training in foreign countries. A programme of training should, therefore. be planned well ahead of actual operations. The recruitment of this staff, too, will create many problems as men with business acumen will be required for the Supply Wing, experts in animal husbandry and seed production will be needed to run the production farms, and farm management experience to reorganise agriculture. The selection of the men for the front-line will also have to be based on considerations of personality, administrative efficiency and drive. The fullest freedom should be given to the Corporations in the matters of recruitment and the fixation of pay and other conditions of service. There should be no bar against the recruitment of foreigners where suitably qualified men cannot be found within the country. The secondment of suitable staff from other departments to the Corporations will only be possible if benefits of promotion are allowed to them during the period of deputation and their return facilitated when they are no longer required by the Corporations. It will also be necessary to allow the Corporations to select personnel from all sources and particularly from the Departments of Agriculture,

Animal Husbandry, Cooperation, Forestry and Fisheries.

Budget & Accounts

16. To safeguard against extravagance and improper use of money, budget and accounts must be properly organised. The allotment of funds should be on the basis of an annual budget prepared by the Corporations and accepted by government. We are anxious that there should be a strict accounting system at all levels and provision for adequate supervision and efficient periodic external audit. We contemplate no reduction in the responsibility of the Auditor-General to supervise the expenditure of public funds, or of the government to see that public funds are not misused. Within these limitations, however, we recommend that the Corporations should be free to operate their budgets.

Evaluation

17. Lastly, we suggest that there should be continuous evaluation of the work of each project and of each aspect of the work of the Supply Wing. Without this evaluation, it will not be possible fully to assess results. The importance of independent evaluation should be recognised by placing the evaluation organisation directly under the Chairman.

18. These are immense tasks and no organisation in the country has so far attempted them. Their successful execution will depend upon the selection not only of the right type of men as directors and higher staff, but also of the men in the front-line. It will also depend on a policy directive from the highest level to ensure that the Corporations will get priority over other aspects of development, that financial backing will be made available to the full, that foreign exchange will be provided in time, and that the Corporations will be free to select personnel from both within and without the country, from official and non-official ranks, and from administrative as well as technical fields. It is essential that the Corporations should be free to employ people as they think fit, on whatever salaries that they think necessary, and to hire and fire their staff whenever the occasion arises.

Basic Legislative Requirements

19. We recommend, therefore, that the legislation setting up the Corporations should, among other things, provide for the following:-

(a) that continuity of programming and planning be ensured;

(b) that the Corporations work on properly prepared budgets approved by government and have proper external audit arrangements through a competent audit organisation;

(c) that the Corporations have an assurance of continuity of financing and freedom from red-tape especially in the sphere of financial sanctions;

(d) that the Corporations have the power to recruit and remove personnel, decide salary scales, and provide facilities, as they deem necessary;

(e) that there be provision for the delegation of large administrative and financial powers to lower echelons;

(f) that there be power to set up such subsidiary organisations as are necessary for carrying out their programmes;

(g) that there be power to enter into commercial transactions and to borrow money;

(h) that the Supply Wing of the Corporations take over the control of all the seed and breeding farms in the country;

(i) that the Supply Wing operate throughout the country as soon as possible, with powers to hire transport, build depots and enter into contract for the supply of their requirements;

(j) that the Corporations have power to set up or encourage the manufacture of such materials as are necessary;

(k) that it be their duty to encourage the development of private and cooperative trade to handle such supplies when Corporations consider it suitable to transfer their operation;

(l) that the Field Wing of the Corporations assume responsibility for agricultural development in areas notified by government as Project Areas, and exercise powers of control over allied departments;

(m) that government delegate to the Corporations such powers as are necessary to enable them to carry out the task of increasing agricultural production.

Relations with Other Departments

Summary of Recommendations in Following Chapters

20. However desirable the quick spread of a package deal of 'five firsts', or other measures may be to the whole country, limitations of manpower compel a phased programme. While supplies can be organised throughout the country comparatively quickly, other measures will move forward more slowly. Until an intensive programme on all fronts can make headway, other responsibilities respecting agriculture and animal husbandry must continue to be assumed by existing departments and agencies suitably strengthened. Our recommendations for re-organising and expanding the agricultural extension service and the redefinition of the responsibilities of other departments concerned with agriculture, are given in the next chapter. Our conception of the relations of the two Corporations with the work of these departments in the Project Areas are clarified here.

Control over Departments

21. The project staff will replace the agricultural extension service in a Project Area, and take over such of the latter's staff as are found useful. To ensure coordination, the staff of the Departments of Animal Husbandry, Cooperation, Fisheries and Forestry in the Project Areas must work in close cooperation with the project staff. To bring this about, we recommend that the staff of these departments be placed under the complete operational control of the Project Director. The staffing of these departments should be reviewed when a project starts, and selected men from these departments moved in, after consultation between the Project Director and the heads of the departments concerned. Once this staff has been assigned to a project, it should only be withdrawn with the prior agreement of the Project Director. They should not be denied the benefits of promotion while with the project organisation. Where there is any refusal

to cooperate, the rules provided for recalcitrant government servants should be applied. In case of inefficiency, the head of the department should be required to provide a replacement. If help is not available from the existing departments, the Corporations should be free to recruit suitable men from other spheres.

Relations with the Revenue Staff

22. The position of the head of the district in a project area needs to be defined. As the Corporations will be carrying out an intensive programme, it is essential that freedom of operation be assured to them. The head of the district in which a project is situated should exercise his normal powers or duty of informing the government and the higher ranks of the Corporation of failures and mishandling of a situation by the project staff, but interference in the normal working of the programme be strictly limited as it might do incalculable harm. The assistance of the head of district will be required by the project staff and such assistance should be made obligatory.

Relations with Public Works Departments

23. The proper use of irrigation water and irrigation facilities should be a responsibility of the project staff. The Irrigation Department in West Pakistan and WAPDA in East Pakistan must continue to be responsible for providing an adequate supply of water at each canal outlet; but beyond that point, they should have no further dealings with the farmer. The project staff should also be responsible for settling disputes about turns of water and for taking up complaints of shortages of water supply with the irrigation authorities. Project requirements of electricity, specially for irrigation, should have priority over other demands. In a Project Area, the operations of tube wells and lift pumps should also be the responsibility of the Corporations. In view of a number of complaints by the development departments that the pace of progress has been retarded by delay in construction by the Public Works Department, we recommend that the project organisation should be allowed to construct its own buildings.

Relations with Credit Institutions

24. We contemplate that agricultural credit institutions, such as Agricultural Development Finance Corporation and the Agricultural Bank, will continue to operate in the Project Areas to finance men of property, and may make an agreement with project staff for the working of a joint programme.

Relations with Village-AID & Basic Democracies

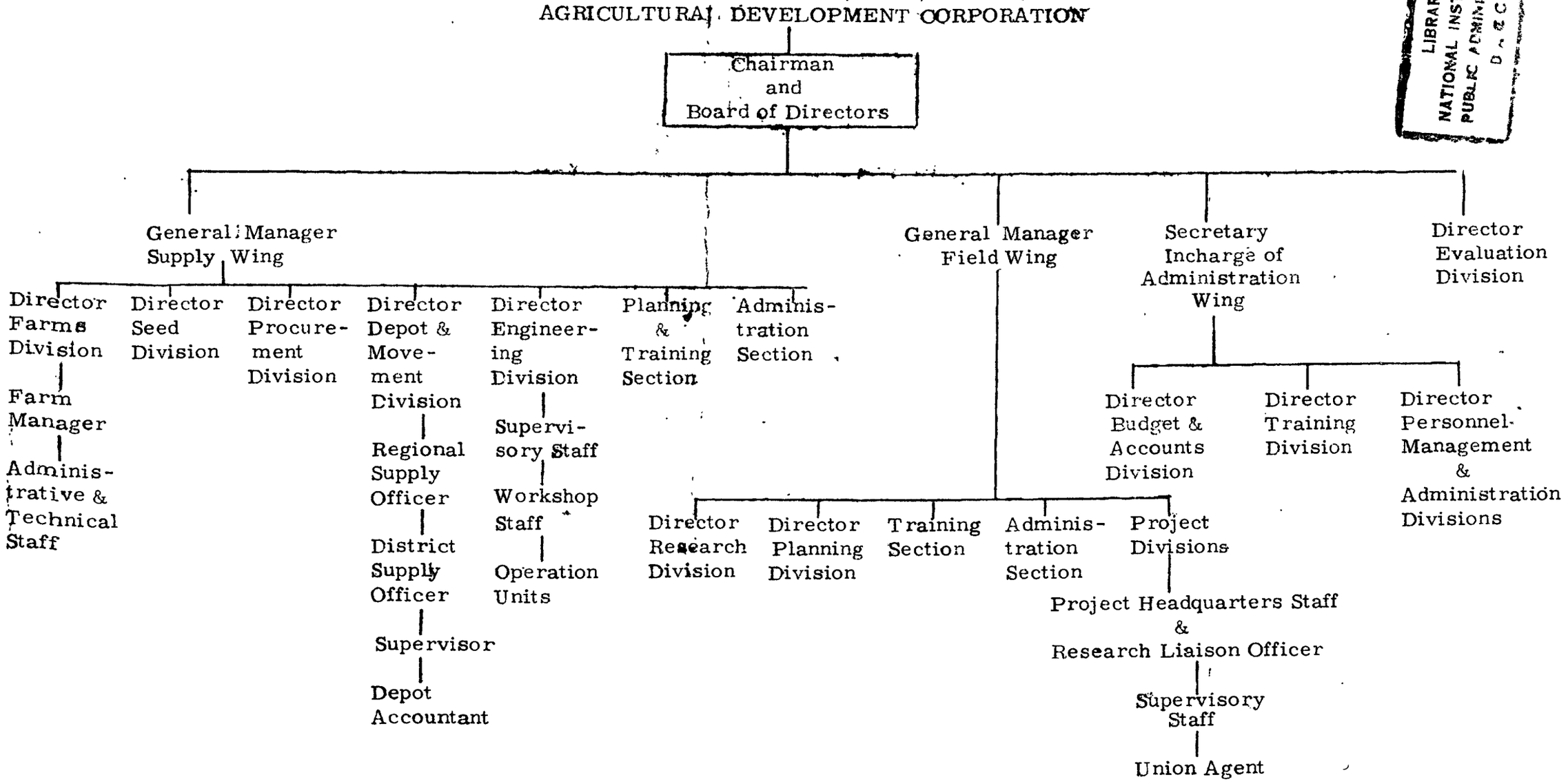
25. The respective responsibility in a project between the Corporations on the one hand, and the Village-AID and the basic democracies on the other must be defined. In our review of the work of the various departments, we indicated that the Village-AID organisation has a large sphere of work in the non-agricultural field. By improving conditions of health, education and communications, and developing cottage industries, they will achieve a great deal and thereby indirectly assist the agricultural drive. The creation of community feeling and a desire for self-help would make a good start for the programme of the Corporations, especially when they try to improve marketing and farm management. If basic democracy fulfils its main purpose of building up a grass-root democratic movement, interest in the whole sphere of development will be quickened. The project programme should, therefore, be closely linked with both these organisations, and, make use of their facilities for propaganda and community action. But the need for coordinated action in the intensive drive for agricultural production is so important that it is essential that the Corporation programme be allowed to run independently as a unit and not be hampered by either politics or departmentalism. We recommend that Village-AID withdraw from the agricultural field and that the basic democracies have no responsibility for the actual execution of the agricultural programme. The project staff must, however, maintain contacts with both organizations and freely exchange information.

Structure of the Corporations

26. We recommend that each Corporation should have a Board of three full-time Directors, selected for their ability to get a job done

Figure I

Organisation of the Proposed Corporations



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and their knowledge of agriculture, and appointed by government for a specific period of time. The responsibility of this Board will be to organise the work of the Coporations, to obtain the necessary finances, to appoint higher staff, to provide facilities for training, to produce or procure supplies and to maintain a liaison with research and experimentation. It will be the supreme body of the Corporation and responsible for all final policy decisions. The Chairman will be the chief executive of each Corporation and will be given wide powers to take action on behalf of the Board in order to expedite work. As the final decision will be that of the Board, the Chairman will exercise his functions on its behalf. We envisage that as the senior-most officer of the Corporation, he will have sufficient status in the Board to impress his personality on the work of the Corporation.

The Supply Wing

27. We are of opinion that the detailed internal organisation of each Corporation should be worked out by the Directors themselves and we consider it unnecessary to lay down any definite organisational pattern. We must, however, explain our intentions and we accordingly discuss below our conception of what such an organisation should cover. We have indicated previously that the operational work of the Corporations will be organised under a Supply Wing and a Field Wing. We assume that each Wing will be headed by a General Manager. The General Manager of the Supply Wing will have under him separate divisions, each under a Divisional Director for management of seed and livestock farms, seed production both in and outside the Corporations' farms, procurement of other supplies, management of depots and movement of supplies and engineering.

Farms Division

28. The Farms Division will employ suitable farm managers, and breeding experts from either within the country or outside of it. A number of animal husbandry officers, suitably trained in foreign countries is available and can be used on these farms on the livestock side. The status and salaries of farm managers will vary with the size of and work on a farm. There may perhaps be an advantage in placing this division in the Field Wing but that decision can be left to the Corporations.

Seed Division

29. We have suggested a separate division for seed production as a considerable part of the country's seed requirements will come from registered growers. We suggest that the Seed Division be responsible for the coordination of the whole seed programme and for the selection of registered growers, the observance of legal formalities, the timely acquisition of seed and the payment of proper prices.

Procurement Division

30. The Procurement Division will be responsible for the procurement of supplies other than seeds including fertilizers, plant protection materials and equipment, agricultural implements, etc. This may involve the making of arrangements for the local manufacture of equipment and the necessary import of raw materials.

Depot & Movement Division

31. The Depot and Movement Division will have a bigger task. It will have to build depots at the union level, and central stores at suitable distribution points all over the country. The central stores will be located and their capacity decided, in accordance with the consumption requirements and communication facilities in the area they will have to feed. We contemplate that each union depot will have a Store-keeper-cum-Accountant, who will keep accounts of sale and credit. There should be a District Supply Officer to supervise the work of the division and to maintain liaison with the district authorities.

Engineering Division

32. The Engineering Division will be responsible for the establishment of an organisation to bore tubewells and install power - pumps throughout the country by way of assistance to private farmers. This will not supersede the responsibility of the West Pakistan WAPDA to provide tubewells as a measure of an anti-salinity programme or a replacement programme of irrigation. We intend, that after the WAPDA has completed such tubewells, the operations will pass to the Corporations.

The Division will also take over the hiring out of tractors for reclamation or for occasional ploughing. It will also take over the existing agricultural workshops in the provinces, organise the repair of tractors, the training of operators, and make a start in manufacture of farm implements and spare parts. When mechanisation gains impetus this Division will be responsible for organising maintenance facilities for farming and irrigation machinery in project areas. Its field staff will be fairly large in the project areas, but will vary in strength from place to place in non-project areas.

Planning & Training

33. We suggest the creation of separate sections for planning and for training in the Supply Wing.

The Field Wing

34. The Field Wing, headed also by a General Manager, will operate through Project Directors who will be in-charge of projects. At the head-quarters there will be a Research Division to keep liaison with research organisations, and to provide the services of research specialists to be attached to each project in accordance with its needs. It will also arrange for such research and surveys as have to be specially organized.

Planning Division

35. The Wing should have a Planning Division as we consider it necessary to have the future programme carefully worked out and local problems and requirements of training and supplies assessed, and a scheme for training prepared.

Project Division

36. There will be a number of projects under the Field Wing, each headed by a Project Director. Each of these projects will be treated as a separate division of this Wing.

Project Directors will occupy key positions in the work of the Corporations. Their selection, therefore, will have to be carefully made. The type of man required for each project may differ, but men

must be found who will be able to lead a compact team to impress farmers and will have considerable drive and administrative ability. As they will be in-charge of all agricultural work in the project, they will exercise wide powers and have a correspondingly high status. While their pay scales will differ in accordance with the size and importance of each project, we contemplate that they will be officers of high status, and not less in rank than a Senior Class I Officer.

Union Agents

37. Equally important will be the man at the Union level, whom we designate as Union Agent to distinguish him from his counterpart in the agricultural extension service. The successful execution of the programme must depend on the ability, personality and drive of this man, who will have to persuade and lead the farmers, supervise without bossing, create an atmosphere for development, smooth-out difficulties and bring about cooperation. We consider it necessary that his pay scale should be equivalent to at least that of the present Agricultural Assistant in West Pakistan. When the work gets under way, he will require the help of one or two assistants. The Union Agent should preferably be an agricultural graduate but we do not want to rule out men with lower qualifications whose experience and ability mark them out. We would even suggest that suitable farmers be recruited for these or some of the higher posts, as long as they have knowledge, efficiency and energy. Much will depend on the training that is given to the union agents and this subject should be given early attention by the Directors of the Corporations. Later, it may be necessary to provide special farm managers for cooperative farms or farming blocks, but in the earlier stages, the Union Agents will have to help in establishing planned farming.

Supervisors & Research Liaison Staff

38. Between the Union Agent and the Project Director there will be one or more echelons of supervisory officers. These should be limited to as few stages as possible, but at least one echelon will be necessary

and may take the form of an officer of the grade of a Class II Officer, over every 10 to 15 Union Agents. Further requirements can be met by providing assistants to the Project Director in larger projects. Each Project Director should be provided with the services of a suitable number of specialists dealing with the problems with which the project is concerned. As far as possible, these officers should be drawn from research organisations and should maintain a two-way traffic between research organisations and the Union Agent. The Project Director should report directly to the headquarters.

Administrative Wing

39. Apart from the two operating wings, the Corporations will have to make, at the headquarters, separate arrangements to deal with those functions which are common to both wings. These functions would include the question of budgets and accounts, the interpretation of rules and regulations, the recruitment of personnel, maintenance of leave records, and liaison with other training organisations. We suggest that this wing be called the Administrative Wing and placed under the Secretary of the Corporation. Since the responsibilities of this wing will be multifarious and highly diversified, its work would be facilitated if it was distributed between different departments or divisions. We, therefore, suggest that this wing should include a division for budgets and accounts, a division for training problems and a dvision for personnel management.

Budget and Accounts Division

40. This division should specify the levels at which various accounts are to be kept and the forms in which they should be maintained, and arrange for audits at regular intervals. The division will also be responsible for preparing the annual budget and other statements for submission to, and approval of, government. The division will have another important and difficult function which will develop into a large business and may require a separate division. This relates to the issue of credit by the Corporations. In the initial stages, credit will be limited to supply in kind of seed, fertilizer, plant protection materials and implements. As the work develops, the Corporations will provide credit assistance for the sinking of tubewells, for the purchase of bullocks and machinery, and similar needs. This will require the keeping of adequate accounts of loans and

recoveries. While the Field Wing will initiate and supervise these loans and will also help in recovery, the accounts will be organised by the Budget and Accounts Division from the depot to the headquarters which will perforce prescribe the rules and methods of keeping accounts.

Training and Personnel Management Divisions

41. Although we have suggested that the Supply Wing and the Field Wing will have cells to handle training problems, it is considered necessary that a separate Training Division at the headquarters be established to keep touch with various training organisations within the country and outside it. This division will also have to make arrangements to give special training where such facilities are not to be found in the existing institutions.

This division will handle personnel matters and administrative details.

Delegation of Powers

42. We attach considerable importance to the fact that there should be devolution of financial and administrative powers to the Project Directors. It is essential that each Project Director should have full control over the staff working within his project. It may be advisable to let him recruit the lower staff and to associate him with recruitment at higher levels. He will also have to be closely associated with the training programmes for his project. The Supply Wing will be streamlined from the headquarters to the depots, but it will be desirable to give the District Supply Officers considerable powers over the depot and supervisory staff. It will be certainly necessary for this officer to have ample funds at his disposal to enable him to take quick action for the movement of supplies and for the maintenance, repair and movement of machines required by the engineering or plant protection staff. In the case of the Farms Division, we would like to avoid a situation mentioned earlier, under which the Farm Manager had no power to hire labour in case of need. Ample delegation of powers to the Farm Manager must, therefore, be envisaged.

43. We believe that a system on the above lines would be reasonably efficient and sufficiently flexible to carry out the responsibilities placed on the Corporations, without fear of misuse of funds and powers. Much will depend upon the supervision by the Directorate and headquarters staff over the whole work of the Corporations, and of the project officers and

the District Supply Officers over the staff within their jurisdictions. If these officers are carefully selected, many potential difficulties will be avoided.

The Programme of the Supply Wing

Procurement of Supplies

44. The first objective of the Supply Wing will be to set up union depots all over the country in close proximity to the project areas. We would like to emphasise the fact that it will be essential that the Corporations handle only good quality materials and should insist on quality in all their supplies. They must endeavour to reach this stage in the shortest possible time, and until then, existing departments should carry on as best they can.

45. In a project, the supply organization will act on the estimated requirements given by the Project Director. In case of difficulties, the Project Director should be able to make representation to the Supply Wing headquarters who would then take necessary action to meet the Project Director's demands.

Pure Seed Act

46. Proper seed production is a complicated operation. We have gone into considerable detail on this subject in chapter 5 of this Report. We recommend that, as a first measure of a new programme, a Pure Seed Act be promulgated, which should lay down the standards of quality and procedures governing the production and sale of seeds. It should provide that anybody agreeing to act as a registered grower should bind himself to grow seed under supervision and deliver the contracted quantities. We do not propose to submit a draft bill but suggest that the new Seed Law be modelled on the one in operation in Cyprus, a country which apparently had similar difficulties to Pakistan. We further recommend the insertion of a provision in this Law giving powers to Government to declare an area to be a Seed Area in which it will be obligatory on farmers growing a sepcified crop to use only seed supplied by the

Corporations and to sell the produce back to them. The Seed Law should be administered by Government which might delegate some of its powers to the Corporations. The Corporations should work in accordance with the provisions of the Seed Act.

Seed Testing & Grading

47. It will be necessary for the Corporations to set up a series of seed testing laboratories to ensure purity of seed both when it is purchased by the Corporations and when it is sold from the depots. They will also have to maintain grading and cleaning machinery at convenient points. We further suggest that the Corporations sow their seed in their own farms to assure themselves of its viability and quality. We further recommend that the Corporations consider the advisability of employing as Director of Seed Services, or as Consultant, an experienced seed producer from a foreign country for a sufficient length of time to enable him successfully to initiate the scheme.

Seed Varieties

48. The production of new varieties will be the outcome of research, and research will have to decide which varieties should be multiplied and introduced. In making this decision the project staff and the extension service will have to be consulted. The Corporations will then concentrate on the production of these varieties. Untill new varieties are introduced, the best of the existing varieties must be selected and popularised. We suggest that the Corporation and research workers should meet periodically to draw up lists of varieties to be multiplied, and to try out other varieties in different ecological conditions.

Multiplication of Seed

49. Nucleus seed will come from the research stations and Corporations will use the nucleus seed for the production of foundation seed for multiplication. This will obviously be done at the Corporation farms and it is important that the breeder should be given every facility to supervise this production. The cost of this supervision will be borne

by the Corporations. The next stage will be the multiplication of seed which should be a commercial operation. In West Pakistan, quite a large proportion of this multiplication will be carried out on the farms of the Corporation. In producing this seed, the Corporations will no doubt use not only their seed farms, but will also take advantage of land available in livestock farms. It may become necessary to increase the present farm areas in West Pakistan but it will be essential to do so in East Pakistan where the present area is small. It should be pointed out that the Corporations must use improved methods on these farms to make them models of high production and to ensure that they are run profitably. Major reliance must, however, be placed in both provinces on getting seed multiplied through registered growers. These growers could either be good, largescale individual farmers or cooperative societies or a whole village or an area declared a Seed Area in terms of para 46. The selection and supervision of registered growers will have to be carefully carried out.

Seed Prices

50. The question of the sale price of seed and of the price to be paid to registered growers is a complicated one. In course of time a system may develop enabling total payment to registered growers to be adjusted at the end of a crop season. A premium will, however, have to be paid over and above prevailing market prices - which itself may be the highest price in the first one or two months of the crop season. The sale price at the depot will normally be higher than the market price as it will include expenses and possibly profits. During our field visits we gained the impression that farmers are willing to pay a high price for good seed. The possibility of subsidizing this price must not be ruled out.

Seed Requirements - Self-pollinated Varieties

51. We have discussed earlier the needs of each crop. We recommend that, until research points to a different conclusion, the present programme of renewing the seed of self-pollinated varieties such as wheat and rice, every 5 years should be followed. This will mean that the annual require-

ments of seed at the most will be 1/5th of the total requirements for each crop. In the case of new varieties, the programme will have to be based on individual circumstances.

Jute & Cotton Seed

52. So far jute seed programme has not made substantial progress, though some improved varieties have been evolved and are being multiplied. Further development of this programme will depend upon detailed studies by research organisations. Cotton too presents a special problem. If purity of seed is to be maintained, strict supervision on the ginneries must be exercised. As the government enforce a zonalisation of cotton varieties, it is under an obligation to supply full requirements. The assurance of good seed produced through the Corporations' farms or registered growers will not be possible for some time, and temporary arrangements will have to be made. As soon as the Seed Act is promulgated, the West Pakistan Corporation will have to apply itself to the problems of cotton seed production, ginning and storage. We recommend that the powers of control over cotton seed production in the proposed Cotton Act be delegated to the West Pakistan Corporation.

Sugar Cane

53. Sugarcane is in a different category as multiplication is by cuttings. The Agriculture Departments at present supply a considerable number of cuttings to farmers. The Corporations will have to take over this supply and it will be necessary to make local arrangements for the production of quality sugarcane in specified areas for the supply of cuttings.

Hybrid Maize & Sorghum

54. One of the hopeful items of future development is hybrid maize. We have discussed its problems in chapter 5. We recommend that the West Pakistan Corporation take over the responsibility of setting up the machinery already procured for a hybrid maize programme. The Corporation will also have to decide what further installations and equipments are required. The present programme envisages full cover by 1965, but

it is hoped that the Corporation will be able to shorten this period. A Pakistani scientist has recently succeeded in applying the same techniques to sorghum as those applied to maize to produce a hybrid sorghum. The Corporation should sponsor the development of this seed and assess the requirements of hybrid sorghum to develop a seed programme.

Berseem

55. Berseem seed is largely grown in West Pakistan. We would point out that the requirements of berseem seed are likely to increase with the improvement of crop rotations and the introduction of mixed farming.

Potatoes and Vegetables

56. We would recommend special attention to the production of vegetable seed and nursery fruit plants. Among vegetables, potatoes offer the best opportunity. As has been mentioned, a potato seed programme is under operation. The main development is in the Quetta Division where imported seed is being multiplied through farmers. The scheme has not been properly supervised, plant protection has been inadequate, and storage conditions also have been unsatisfactory. The West Pakistan Corporation will, therefore, have to devote itself to the improvement of this programme. The development of potato production is important from the national point of view and depends largely on the supply of good seed. We would suggest that, as has been planned, areas in the Quetta Division such as the Ziarat Valley be set aside, with the addition of areas in other parts such as the Murree Hills for the growth of seed only and that improved seed be supplied to local farmers. Production in the hills should be sufficient to meet the needs of both provinces. The formation of cooperative societies to help in the control of seed production should be one of the ojbectives of the Corporation. Cold storage facilities for the storage of seed until the next sowing will be essential outside the hills, and the two Corporations will have to provide them.

57. In the case of other vegetable seeds, especially varieties which

varieties which deteriorate in the plains, we suggest concentration of effort in the Murree and Hazara hills. The Murree Hill Commission report drew up a vegetable seed programme to provide assistance to the farmers of Murree Hills through cooperative societies formed for the purpose and through a marketing board composed of these societies. It envisaged that the area be earmarked for seed production and all the seed produced marketed through this board. In our view, this area, together with the Hazara hills, can form a project under the Corporation and the project staff could work for and organise seed production on the same lines. After the seed is produced, it could be passed on to the Supply Wing for further distribution. The development of vegetable farming should be one of the objectives of every project. The vegetable seeds which cannot be grown in East Pakistan should be supplied by these projects.

Fruit Nurseries

58. The Departments of Agriculture maintain fruit nurseries. The Corporations will take charge of these nurseries and develop a large potential so that fruit culture is much more widely spread. It may be possible to maintain nurseries on the seed and cattle farms which will enable the Corporations to supply plants from all climatic zones. Similar programmes will have to be prepared for other important crops.

Future Development of Private Trade

59. Once the system has been successfully established, the Corporations should try to build up cooperatives and private trade to take up the production of seed. A start in coopeeative production may come through first using them as registered seed growers. We recommend that the Corporations should provide cooperatives and private persons with the means of establishing themselves. As soon as private or cooperative trade is established in an area, the Corporation may plan to withdraw from seed production and distribution.

Fertilizer

60. We pointed out elsewhere that the use of chemical fertilizers has enormous possibilities. While some progress is being made in its use, it is still comparatively slow, but it is possible that the country will be in a position to utilise the full production of the three nitrogenous fertilizer factories by 1965. We would recommend that action be taken in good time to expand the capacity of the fertilizer factories at Multan and Fenchuganj to meet expected future requirements. The use of phosphates and potash will also rise considerably by then and consideration should be given to the need for manufacturing larger quantities of these fertilizers within the country. Until the new fertilizer factories are producing to capacity, and until that capacity is increased, imports of fertilizers must go on an at increasing rate. The Corporations will have to purchase fertilizers not only from the local factories but also from foreign countries. They must therefore have an assurance of adequate foreign exchange and internal finance for this purpose. It would be preferable to carry excess stocks of fertilizers than not to be able to meet all requirements. We would point out that, with the new stress on extension, fertilizer is likely to receive the earliest impetus and it is a matter of great importance that those who have been persuaded to use fertilizer are not frustrated by the lack of supplies.

Fertilizer Prices

61. In our Interim Report, specific suggestions were made about the price of fertilizer, and we see no good reason to change the suggestions made therein. We, therefore, repeat that the prices of fertilizers should be fixed as follows:-

East Pakistan

Rs. 12/- per bag of 50 kilos of urea
Rs. 12/- per bag of 50 kilos of triple superphosphate

West Pakistan

Rs. 7/- per bag of 50 kilos of ammonium sulphate
Rs. 6/- per bag of 50 kilos of single superphosphate (from Lyallpur Factory)

The prices of other fertilizers should be fixed in relation to these prices. In the Interim Report, we had suggested that these prices be maintained for three years. As the country is now working on a five year programme, we recommend that the prices be maintained till 1965. After that period, prices should be reviewed. By then, farmers are likely to have been persuaded of the benefits of fertilizers and it will be possible to appreciate the prices.

Plant Protection

62. We have emphasised the need of making plant protection an integral part of the work on the farm. It will be one of the principal aims of the Corporations to induce the farmers to carry out their own operations. The project staff, with the assistance of the Plant Protection Specialists attached to the project, will start the work and provide technical advice in the use of chemicals. While in the early stages, plant protection service will have to be free, as at present, efforts will be directed towards persuading the farmer to hire equipment and purchase chemicals. Credit should be available for this purpose. Wherever a cooperative is formed, it should be persuaded to stock such equipment for the use of its members either free or on hire. The project staff will also have to organise general campaigns for the eradication of diseases and pests in a whole area & for combating an epidemics. It may sometimes be necessary to give powers to the Corporations to enforce the use of plant protection measures when considerable damage to crops is anticipated. At such times the work may be done by the extension staff and expenditure recovered as in the case of loans.

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1. We do not think it necessary to go into the question of percentage of the price at which the subsidy should be fixed. Most of the governments of under-developed countries subsidise fertilizer use. As we intend to increase fertilizer use in this country at a very rapid pace, subsidy is inevitable. As prices vary it is advantageous to keep to a fixed subsidized price &notto a percentage. We would, however, like to point out that on the actual fertilizer prices in the world market at the present time, the subsidy involved in the above form is not much higher than 50 percent.

Improved Cultivation

63. Improved cultivation techniques require a number of implements. We have discussed the possibilities in a previous chapter. The development of more economic and useful implements will depend upon developments in research. As in the case of seed, the Corporations will have to arrange for their manufacture and supply to depots. The manufacturers' requirements of raw materials will have to be met by the Corporations. When a project is started, a survey should be made of the improved implements whose use is to be encouraged and supplies should be placed at the disposal of the depots for issue on sale or credit. Implements such as furrow turning ploughs which are only occasionally needed should be available on hire from the depot, or through a cooperative.

Maintenance of Machinery

64. The value of irrigation machinery is growing with emphasis on tubewells in West Pakistan and power pumps in East Pakistan. The concerted use of power pumps in the Haor areas of Mymensingh, Sylhet and Tippera has shown some good results and is capable of expansion. The Supply Wing will have to organise both the provision of pumps and their maintenanc Similarly, in the case of tubewells, an organisation for maintenance would be of considerable assistance to private farmers, and we consider that such maintenance should be extended to them.

Seed and Breeding Farms

65. The seed and livestock farms of West Pakistan extend over a considerable area. Their expansion and management by the Corporation has already been recommended. We suggest that, except for farms where international projects have to be separately maintained, all the seed and livestock farms should be combined for the purposes of administration and used for the production of seed, cattle and poultry, and the development of mixed farming techniques. Generally speaking, the advantage of using mechanisation on these farms will be the avoidance of the inefficiencies of tenancy farming and of the use of good seed for food.

Transport

66. The transport of supplies will require considerable managerial ability and may have to take the form of a military supply organisation. We do not, however, contemplate the setting up of a complete transport organisation. We think that the Supply Wing will have to maintain sufficient transport of its own to meet emergency needs and to supplement private and public transport. Agreements with railway authorities for priority treatment for movement of supplies, and with private transport for movement on roads, will have to be made by the Supply Wing.

Encouragement of Private Manufacture

67. Finally, we recommend that the Supply Wing of the Corporations should encourage private industrial activity in agriculture. The possibilities of the local manufacture of many implements have already been explored. The Corporation will have to encourage the expansion of the existing diesel engine manufacturing industry, the setting up of cold storage plants, the renewal and establishment of ginneries, oil expellers and rice huskers, and may even have to assist in the promotion of local manufactures to meet these needs. The local manufacture of farm machinery including tractors, could be stimulated by the Corporations.

The Work in the Project Areas

68. The techniques that can be applied to the increase of production have been discussed in detail in chapter 5 of this report. Their application in individual project areas must now be considered. Earlier in the present chapter, we have made recommendations on the methods of establishing a project and on the field staff who will operate it. We have also indicated that the Supply Wing and the land consolidation authorities will have to give priority to such Project Areas.

69. We attach importance to having a proper survey of the problems and potentialities of a Project Area before the project starts operating. A survey covering the economic standing of the area, the state of agriculture, local attitudes to development, the present availability of credit and supplies, and similar matters, may with advantage be undertaken

either directly by the Field Wing or by organisations like the National Sample Survey.

70. When the project staff is in position, its first task will be to popularise the 'five firsts' in the area. This work will be carried out primarily through demonstrations, through contact with good, progressive farmers, and with the assistance of any viable local cooperative society. The first task of the Union Agent will be to plan the layout of his demonstrations and to establish contacts. He will have to space his demonstrations according to his plans. In some areas it may be preferable to concentrate demonstration in one village and bring farmers there. While it is unnecessary to repeat the information about the 'five firsts' already given, it should be remembered that in a project the use of credit must be supervised. The Union Agent will help the right type of farmer to obtain supplies of seed, fertilizers, plant protection materials and implements from the depot on credit and then instruct him in their proper use. He will supervise their use as closely as he can. Where a farmer is not carrying out his instructions, he will use persuasion but he may also use the threat of recovery or of refusal to assist with the next crop. It is desirable that threats should be as few as possible. The agent will arrange that some farm implements are issued on loan at first and then on hire. He will arrange visits of farmers to demonstration plots, and further visits when the crop has ripened to show the effect of the use of the five firsts. During farming operations, he will persuade farmers to prepare seedbeds carefully and do weeding. Seed drills and weeders should be available at the depot. Line sowing at least in crops like cotton and jute will have to be emphasised. The Union Agent will organise plant protection by inducing farmers to spray their own fields regularly with hand sprayers purchased by or hired from the depot. He will also organise larger prophylactic and crop sanitation campaigns. As the work develops, a number of power sprayers will have to be provided in the Project Area.

71. His next step will be to induce the proper use of water. In the irrigated tracts, this will take the form of persuading farmers to re-align

water channels in straight lines, where they are not already so aligned, and to keep them clean. He will show them how to prepare proper take-off points. Later, efforts should be made to line the water-courses. At the same time, he will try to demonstrate the advantage of the levelling of land to ensure a better use of water, a better irrigation layout and ridge sowing.

72. At the same time, the Project Director will select an area in his project in which more intensive work will be started. In this area, he will explain the benefits of a correct crop rotation based on information available from research. Demonstration in this area will naturally be continued for sufficient time to show vividly the advantages of the use of such rotations. Where possible, proper manuring and even green manuring will be introduced. The use of implements will be more intensive and in greater variety, and most of them will be made available on hire. Much will be gained by the use of threshing machinery principally of the type of hand-threshers. This would save time at harvest and greater attention could be given to the preparation of seed beds and to green manuring. His next step would be to introduce new varieties and popularise the use of balanced fertilizers recommended by the research organisation. Experimentation and demonstration will naturally be needed for this also. In this connection, we recommend that provision be made to pay for losses on experimental plots should such occur. Where the farmer does not obtain good results from the adoption of the methods recommended, the Union Agent, with the assistance of the appropriate research liaison officer, should go into the causes of failure and amend the programme accordingly. Where the water supply presents no problem, attempts will be made to do away with fallows and introduce double, and in some cases, triple cropping. The practice will have to be tried out first in the research stations and then on a demonstration plot.

73. After this has been achieved, mixed farming and diversification of crops should be introduced. Fodders will form a part of improved cropping patterns. Extended use of berseem not only as a fodder but

also as a soil fertilizer would be an essential part of the programme. We have already indicated some other crops which would give similar results. The Union Agent would then encourage the development of animal husbandry on the basis of more suitable feed, including concentrates, the provision of which should be made through the Supply Wing. The advantages of rearing cattle not only for milk and ghee but also for beef and mutton will be explained and attempts made to rear cattle as a part of farm husbandry.

74. The introduction of cooperation is a matter of great moment. Existing failures in building a proper cooperative movement have partly resulted from its introduction from above. The education of the farmers in its economic advantages must be the base of a successful movement of this type, and subsequent efforts made to induce them to combine. Local factionalism has wrecked many a good effort and it would be beneficial to create smaller societies in which homogeneity could be ensured. The advantages of large-scale business operations can be gained through a combination of these societies into secondary units. It is our intention that, at the outset, cooperative development should be carefully nursed and trained secretaries provided by the Corporations to give management assistance. After the work has developed, this assistance will not be necessary, as part of the general programme should be to enable people to manage their own business. This task will be one of the hardest among those assigned to the project staff, but so important is it for the future well-being of the country, that the project staff must bring to its accomplishment hard preparatory work and continued effort. Initially, these societies may take the form of credit and supply societies, drawing their supplies from the Union depot. As a part of the project programme, these supplies could be diverted to them without much difficulty and supervised credit provided. As a first attempt, good existing credit societies could be persuaded to expand their activities to the distribution of supplies to members and to make a start in cooperative marketing of some major

cash crops. As soon as a sufficient number of cooperative societies has been formed, secondary societies, through the combination of primary societies, should be brought into existence to provide business and financial management. The byelaws of the new societies should be sufficiently flexible to permit shifts from credit to supply and from supply to marketing and even to farm management.

75. As a first step to better organised marketing, we recommend the creation of an organised warehousing system. We do not recommend a countrywide warehousing organisation beginning from the top, such as has been introduced in India. Instead, we think that the societies could start working on marketing by introducing warehousing in the villages. It may be advantageous to provide warehousing in the building in which the Union depot is housed. Initially the programme would provide merely for the storage of farm produce against which credit would be issued by the Corporations or by the cooperative banks. Combined marketing on behalf of the farmers from warehouses to the market town might follow. Before this is done, the introduction of grading should be attempted. Once the supplies and marketing cooperatives have been organised, the Corporation may plan to hand over the supply side of their work to these societies but must continue to supervise the work of cooperatives for some time.

76. We have discussed the advantages and disadvantages of mechanisation in the chapter on Techniques. The introduction of mechanised irrigation is the easiest part of the undertaking. The project staff will introduce lift pumps and tubewells in East Pakistan wherever winter irrigation and spring sowing under irrigated conditions can be introduced and where they are not already used. The Supply Wing should, however, organise maintenance centres. In West Pakistan, where irrigation is so important, the planned development of tubewells and the electrification and mechanisation of existing percolation wells should be attempted. In the case of tubewells, several methods could be used. In some Project Areas where underground water is ample, the main emphasis may be

in assisting the farmers with credit, in the boring of the hole, and in the installation of machinery. Such tubewells may be installed through cooperatives where individual farms are not prosperous enough to be able to run a tubewell. In some cases, it may be possible to arrange that a farmer may instal a tubewell and sell water to others on an agreed basis. In other areas, it may be possible to have a large number of tubewells installed on a regular plan with a properly organised power supply and recover the cost from the farmers as long term credit.

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77. The farm implements to be introduced falls into three classes. The first covering the improved local implements is one of the 'five firsts'. The second covers other aids, like improved hand threshing implements, and grading and cleaning machinery. The third is the large range of agricultural implements in use in Japan which will be of considerable assistance in East Pakistan and in some areas of West Pakistan. Their usefulness will have to be investigated both generally and in the Japanese and German centres which have already been set up in East and West Pakistan. Such instruments as are found useful would be stocked in the depots by the Supply Wing.

78. The comparative usefulness of larger or smaller tractors must be decided in accordance with the needs of each farm. Cooperative machinery societies and cooperative farming societies can be used to meet this need. While initially the Corporations will provide maintenance facilities for this machinery, cooperatives for maintenance should be built up. Cooperatives could also provide machinery for hire by farmers. Where cooperatives be induced to do so, the Corporations could provide tractors on hire c persuade private farmers to engage in the business of hiring out the to other farmers. We do not contemplate an early shift from bullock tractors and expect that, at early stages, tractors will provide additio assistance in work on which time can be saved. Success in the introdu of machinery must ultimately depend on efficient management and m

79. The final development in our programme is re-organisati

In an earlier chapter, we have discussed the problems of population pressures on land, and the resultant small holdings in most of East Pakistan and in parts of West Pakistan. The areas where small holdings exist cover the largest part of our agricultural area. Investment of capital on individual small farms has its limitations. It is, therefore, essential to combine small farms into larger operational units. With the ever-growing population, it is not possible to leave this matter to natural development. We are convinced that for the purpose of enabling better farm management, there is no alternative to organising cooperative farming or a block system of cultivation. We do not advocate cooperative farming of the type practised in China and Russia where land is jointly owned and each operator is paid in accordance with the work performed as this raises a host of other problems.

80. A conception of a cultivation holding, which may become a permanent feature of the agricultural picture, comes from Dr. Otto Schiller, an FAO Expert from Germany. His idea was to try to induce a number of land owners to surrender their cultivation rights to a cooperative society, on asssurance of payments of cash rent or a share of crops customarily due to an owner, and then to re-organise the land dividing it into suitable cultivation holdings each of which could be cultivated by one member. The land of the society would be individually cultivated under a joint management plan in accordance with the requirements of proper rotations and diversification of crops. Cropping could also be planned in blocks so that irrigation and plant protection could be conveniently applied. The society would also organise supply and marketing, and introduce machinery. The cultivation holdings would be preserved irrespective of changes in land ownership and the area operated as a large farm with cooperative credit. Membership of the society would be open to all those who will actually farm the land, including such owners as wish to participate. The method has not yet been tried and might be worth an experiment.

81. Owing to a general disinclination to surrender land, Dr. Schiller subsequently produced a modified scheme under which cultivation holdings

were not envisaged and the local farmers formed a cooperative instead without surrendering their land. Joint planning of agriculture, joint marketing and provision of supplies, and the introduction of machinery were aimed at. This plan together with more efficient farm management, cultivation in blocks, ridge sowing and proper irrigation layout is a less difficult method of introducing cooperative farming.

82. In the Punjab area of West Pakistan, something like 200 villages were settled in the form of cooperative societies, which are lessees of land from government with each cultivator as a member. We have described their present situation. They have the advantage of having comparatively larger farming units, arranged in blocks, and have a cooperative structure where a good farm manager can introduce all the practices we have indicated. Considerable importance is attached to the need of developing these villages. At present, a cooperative officer, without agricultural training, is acting as manager of the society. If a properly trained farm manager of the type of our Union Agent could be attached to each cooperative farming society, there is undoubtedly ample scope for improvement. These areas should be taken over by the Corporation immediately, and put under a separate project. In these areas, the start will still be through the extension of 'five firsts', but cropping patterns, irrigation improvement and rotations as well as ridge sowing and introduction of machinery will be possible in the shortest possible time. Work here may establish the pattern of development in other areas.

83. Problems will arise in trying to organise farming cooperatives. Some farmers may not wish to combine, or there may be too great a domination by a particular group. In such cases, it may be advisable to introduce the block system of farming. A block system, however, can only be introduced under a legal enactment as otherwise conditions cannot be enforced. We recommend that legislation along the lines of the Consolidation of Holdings Act may be enacted to provide that wherever

any contiguous area of small farms below subsistence level exists, and a majority of wners of such lands are willing to combine in a block system, the area shall be declared as 'Agricultural Block', and shall be operated through the project staff with the aid of a farm manager. The project staff in areas where such a system makes headway, will have to provide asufficient number of personnel trained in farm management to organise the work. A portion of the produce will have to be set aside for the expenses of the administration. The system can be introduced in new colonies by making compliance with its needs a condition of lease.

The processing industry ust play a significant role in re-organisation of marketing and farming. We consider it important that processing industry be linked to the cooperative marketing organisation wherever it is established. In an area which depends largely on cash crops like cotton, jute or sugarcane or possibly rice in certain areas, this link will be easier to establish, as loans can be recovered from the sale price of member's cash crops. In such a case, the cooperative will have to control the marketing of the particular cash crop through byelaws of the cooperative.

85. In addition to these measures, project staff will have to devote attention to several other measures. As dairy development is to be stressed, it will be necessary to organise adequate marketing. It will also be advantageous to organise facilities for the marketing of the beef and mutton animals produced on the farm or on the range. Poultry production both in the form of eggs or table birds will have to be encouraged and marketing organised. Wool shearing facilities and instruction in the correct flaying of hides and skins will have to be given. Farm fisheries will have to be imporved and developed. Shelter belts will have to be planted. A larger production of vegetables and fruits, both for the use of farmers and for the market, will have to be encouraged. Wherever possible or necessary, attention will need to be paid to the improvement or creation of fuel and timber reserves. Finally, there must be a greater

emphasis on savings out of the new higher incomes for further investments. Such measures will require much more intensive cooperative action than at present, though many of them will be undertaken by individual farmers.

86. This general programme of work would apply to a normal Project Area, but there are a number of problems in many of these areas which will require special programmes in addition. We have elsewhere discussed the problems of salinity, and the methods to overcome them. Once water is assured, there will be an excellent opportunity for the introduction of mixed farming as the cultivation of legumes will help to improve deteriorated soils. Continuous cropping should make it possible to eliminate the fallow and to increase production on a very large scale, It will be necessary to maintain a fairly rigid system of cropping and irrigation until injurious salts have been leached away, This will apply to areas like Rechna Doab for which a detailed programme has already been prepared by the irrigation authorities.

87. In East Pakistan, the introduction of irrigation confronts farmers with problems with which they have previously not been familiar. The digging of field channels, the development of an agreed system of turns in the use of water, the levelling of fields, and the consolidation and rearrangement of holdings are the necessary prerequisite to the best use of this new aid to production. Suitable cropping patterns and rotations must be developed through experimentation. In the Haor area in East Pakistan, power pumps have been used to grow a Boro crop. The work has apparently given satisfactory results but the area of use is limited and the maintenance of pumps needs to be reorganised and the cost of operations reduced. The system can nevertheless be extended to other areas. The development of a polder area, like the one under development in the Khulna district, would necessitate initial flushing of fields before improved cropping system can be introduced. As in other projects, the development of detailed local plans will be necessary.

88. In new areas, like the G. M. Barrage, circumstances are different. We have the advantage of starting with a comparatively clean slate. In part

of this area a poor type of agriculture based on flood water irrigation has been practised. In the rest, much of the land has to be levelled. Since the danger of salinity is acute in [illegible] extensive drainage systems will be necessary. The task of a project in such an area will be manifold. It will naturally start with planning proper irrigation channels. We suggest that these channels be built and assistance given in land levelling by the project organisation and the cost recovered from the farmer over a long period. The introduction of 'five firsts' will follow with the proper crop rotations and diversification. Mixed farming will be a part of this diversification. The introduction of cooperative farming in the newly settled area on the pattern of the cooperative societies of the Multan area is easier where a new start is to be made. Land should be allocated in such a way that the introduction of block farming would be possible. A move towards cooperative marketing through cooperative societies should then be attempted. The project staff will have to organise proper processing and marketing as an aid to farmers. Such a marketing structure is easier to build in a new area as it should be possible to lay down, as a condition of allotment, that the marketing of certain crops should be made through the processing industry organised by the project staff as has been done in the Gezira Scheme, or through cooperatives. Credit could then be linked to marketing.

89. At present, the G.M. Barrage programme is under the control of a Land Utilisation Committee at the headquarters of West Pakistan Government, which works through a Project Committee in the area. A separate budget and accounts have been assured and it is proposed to organise the colonists into cooperatives. Once a Corporation is established, there would be no purpose in continuing this committee and the area could form a project of the Corporation. As long as the selection of colonists is made on the lines indicated in chapter 10 of this report, it need not concern the project organisation. It will, however, be responsible for all the proposed agricultural development. It may be advantageous to give the project staff complete control of the layout of village abadis, provision of

communications and drinking water and the building of schools, but we do not consider this programme essential to our purpose if provision of these services can be made outside the Corporation organisation. If this is not possible, the project staff may have to assume complete responsibility. We have not attempted to draw up a full programme for the development of G. M. Barrage as details must be worked out by the Corporation after it has been set up on the basis of developments that may have already taken place.

90. In many areas of East Pakistan and in some districts in West Pakistan the problems of high population pressure are particularly urgent. Special steps must be taken in these areas to increase incomes. In East Pakistan the district of Tippera and Noakhali, and in West the district of Sialkot fall within this category. While the proper use of the 'five firsts' would provide an immediate remedial measure, the reorganisation of farms and cooperative development may have to be taken up much earlier than is contemplated in other places. The availability of sweet underground water in the Sialkot district makes it possible to plan organised tubewell development. The introduction of cooperative farming has already been attempted. In Noakhali and Tippera the expansion of the use of tanks for irrigation is feasible in some areas.

91. The rain fed areas in the northern part of West Pakistan have been described in the earlier chapters and their possibilities discussed. A project in those areas which would develop the techniques already discussed should be undertaken in addition to other requirements of a project programme. The Kachi, and Pat areas of Sibi and Jacobabad districts are capable of development by basin irrigation.

92. Much of the arid areas of West Pakistan, such as the mountains of Baluchistan or the deserts of Bahawalpur, Sind or the Thal, offer small opportunities for irrigation. These areas are already devoted to production of livestock. We have noted handicaps of the producers and the inadequacies of their output. There can be no doubt that a proper range management programme carried out in these areas can result

in the building up of a large cattle and sheep industry which will develop the present potentials. It will be necessary to run special projects separately in the mountain and desert regions to evolve techniques through which existing methods of livestock production may be improved. Once these techniques are established and a survey of private rights in these areas, (which we understand is being taken in hand) is completed, private enterprise should be encouraged to enter the field of modern ranching on a large scale. Because of its vastness, this area offers great opportunities. The Muslakh range programme in Quetta seems to be running at a fairly high cost, but a possible line of development may be found in a modification of the attempt made in the Esplinghi area of the Kalat district in which use was made of the present tribal system to encourage controlled grazing, controlled movement of stocks and better feeding.

93. In our discussion of vegetable seed production, we have referred to the Murree and Galli hill areas in the north of West Pakistan. In addition to seed production, this area has some of the principal forests of West Pakistan. These forests have been denuded and need better management. With a project working in these areas, it will be possible to develop both a seed programme and to improve fruit and timber production. There is a number of village forests in this area which have been almost destroyed by unmanaged use; a revival of these forests should be a part of the programme. The replacement of goats by sheep in this area may bring about considerable amelioration.

94. Similarly, a project in the Quetta area would not only permit the development of a potato seed programme, but would also assist the fruit industry, which is already of considerable value. The project organisation will help to eliminate pests and diseases, introduce improved varieties, establish grading and better marketing. A fruit processing industry should also be established.

95. Riverine areas present further potentialities. Improved early maturing varieties would replace the present system of cultivating mixed

crops in the same field and thus raise yields. The timely tractor ploughing of large areas would enable more extensive sowing and the control of weeds.

96. In East Pakistan, the Chittagong Hill Tracts is an obvious area for a large scale development programmes. Here, winter irrigation is possible along the streams, some small streams can be dammed, new areas can be brought under the plough and the extension of orchards and tea and rubber estates encouraged. The planned development of forestry is already going on in a part of this area and should be extended to the whole of the district.

97. The number of projects which can be undertaken by the Field Wing of the Corporation in each province must depend, as we have already emphasised, on qualified manpower. We recommend that initially a few projects be selected and, as more and more workers are trained, new projects taken up. The completion of the work in any one project is of necessity a slow process and we do not intend that no new project should be taken in hand until other projects under operation have been completed. We give below a list of projects which in our view will enable the Corporations to seek the solution of the various problems involved in Pakistan's agriculture, and in which research in techniques for application to other areas is possible. The list is a large one and, while it is our intention that only some of these projects should be selected in the first year, planning will go on for others so that they can be taken up one by one. This list has been prepared separately for the two provinces and deals with areas of high production where intensive action can bring immediate results, and with areas where there are special problems to be solved, and areas where special programmes are envisaged.

West Pakistan

1. Areas of high production

(a) One district out of
i) Montgomery

ii) Rahimyar Khan
iii) Nawab Shah

These districts generally have comparatively more progressive farmers and they grow a variety of crops.

(b) Similar districts with special emphasis on one or two crops:-

Gujranwala and Larkana where rice is the predominant crop. Tharparkar and Multan where cotton predominates, Mardan where sugarcane, maize and fruit predominate.

2. Special Problem Areas

(a) New colonisation areas :- G. M. Barrage.

(b) Area of high population pressure where reorganisation of farming is very important: Sialkot

(c) Salinity affected area: Rechna Doab. A detailed programme has already been prepared for this, under which a number of tubewells have been sunk and the building of surface drains is in hand.

(d) Soil conservation area: Rawalpindi

(e) Hill catchment area: Murree and Galli Hills.
This area will also be used for re-afforestation and seed farming.

3. Areas where special programmes are to be run

(a) A Hill Range area in Baluchistan; preferably along the new Karachi-Quetta road.

(b) A desert range area: Cholistan in Bahawalpur Division.

(c) Cooperative society villages in Multan area. This will enable the development of techniques in Cooperative farming and marketing.

(d) Quetta area including the Ziarat Valley for potato seed and fruit development.

(e) A riverine area: any small area between the Kalabagh and Sukkur wiers on the Indus River.

(f) Flood irrigation area where problems of basin irrigation will have to be studied: Pat area of the Sibi plains.

East Pakistan

1. Areas of high production

(a) i) Mymensingh
ii) Rangpur
iii) Pabna districts

It may be possible to select two districts in this area, one of which should be Mymensingh because of its emphasis on jute.

2. Special problem areas

(a) Areas where new irrigation is being introduced; Kushtia district in the Ganges-Kobadak Scheme, to be extended to Jessore district when irrigation water is made available.

(b) That part of the Khulna district where Khulna polder programme is being developed.

(c) One of the two high population-pressure districts: Tippera or Noakhali.

3. Areas where special programmes are to be run

(a) Dinajpur district where a tubewell programme is under way.

(b) Haor areas of Mymensingh, Sylhet and Tippera where lift irrigation has already been introduced.

(c) Chittagong Hill Tracts.

Conclusion

98. This discussion of the problems and remedies highlights the problems of a production drive. We are not suggesting the Agricultural Development Corporations as the panacea for all problems, but as the best possible instrument to provide the farmer with all the services he needs if he is to manage his land properly and really succeed in increasing his output.

99. We hope that the Corporations will be accepted as working on behalf of all agriculture departments and expect that liaison will be maintained with them so that the production drive moves forward in a coordinated manner.

CHAPTER 8

SERVICING THE FARMER IN OTHER AREAS

Introduction

1. We are convinced that a real and lasting effect on agricultural production can only be achieved by a concentrated and sustained campaign in the manner outlined in the previous chapter. The setting up of the Corporations and the planning and development of the programme will, however, take time. In the initial stages they will, except for supplies, be operating in limited areas and the full impact of their efforts to increase production will not be felt for some time. In the meantime, the need for increased agricultural production is urgent and, thus, while the Corporations are getting under way and gathering momentum, every effort must be made throughout the country to increase production by making full use of the available knowledge, personnel, supplies and organizations. The supply wing of the Corporation is likely to be in position earlier than the other wing, and should be able to give considerable assistance. At the same time a limited number of measures could be selected, the application of which, even by themselves, can bring about considerable increases in production fairly rapidly if a national effort is made. Emphasis on the increased use of chemical fertilizers is particularly urgent because the two new factories will be producing half a million tons of fertilizers (in equivalents of ammonium sulphate) by 1962 and this will have to be absorbed. This chapter deals with our recommendations on the above matters. It also deals with the reorganization of the Departments of Agriculture and with the changes in the responsibilities of other Departments dealing with agricultural subjects.

Special campaign for Increasing Production

2. In Chapter II of our Interim Report (which appears in an appendix) we recommended a Crash Programme for 1960, covering the rice and cotton crops during the kharif season in West Pakistan and the Aman rice crop in East Pakistan. This programme envisaged a national

drive to step up the use of fertlizers and plant protection measures and, in the case of cotton, of line sowing. The programme has been carried out only in part and has lacked the national effort which we thought was necessary to focus attention on agriculture and to maximise the country-wide use of fertilizers and plant protection. The reasons which impelled us to make that recommendation still apply. We understand that the Ministry of Food and Agriculture has now decided that the programme should be put into full operation in 1961. We suggest that the new campaign should open in January starting with the removing of cotton sticks and rice stubbles in West Pakistan, and that it should follow the lines we had already proposed. In the case of plant protection, the cover envisaged in the Interim Report should be sufficient. As regards the supply of improved seed, the reasons for not including this in the Crash Programme still apply. The fertilizer programme envisaged for West Pakistan in 1960 can be applied in 1961. In East Pakistan, however, we see no reason why the aus crop should not now be included and suggest that the programme should cover both the aus and the aman crops. This will require an increased fertilizer use of 15,000 tons of urea and 10,000 tons of triple super-phosphate in excess of the quantities suggested in the Interim Report.

3. The details worked out in the Interim Report on the organization necessary to carry out the programme need not be repeated here. It is essential that the supplies of fertilizers and plant protection materials required for the programme should be available well ahead of time so that there can be no breakdown because of their non-availability. We understand that contracts have already been placed for a major portion of these supplies. Action should now be taken to ensure the balance of requirements arrives in good time.

Control of Common Weeds

4. There are two prevalent scourges in the form of weeds which do great damage to crops - pohli in West Pakistan and the water hyacinth

in East Pakistan. While it may not be necessary to pass special legislation for their removal, we feel that for some years special annual campaigns to eradicate them should be carried out under the coordinating authority of the district officer who would require the public and all departments and organizations to take part.

Role of the Department of Agriculture

5. A second line of attack on the production problem should be through a sustained effort by the existing departments. The present extension services of the Departments of Agriculture, when they are freed from the duties of receiving, checking, distributing and accounting for fertilizer and other supplies, will be able fully to devote themselves to their main work of extension in the field. With this new found freedom to devote themselves almost entirely to field work and by concentrating their efforts on a limited number of objectives, such as some of the five firsts, they will be able to bring about increased yields within the present pattern of farming. To make this service more effective, however, it is essential that the personnel size and facilities of the departments be suitably expanded. The shortage of qualified technical manpower and the demand from the Corporations for the best men will make it difficult to provide them with highly trained staff. It will, therefore, be desirable to restrict the scope of the agricultural extension service to operations which can be carried out by a worker of the level of the present Union Assistant in East Pakistan and the Mukaddam or Field Assistant in West Pakistan.

Scope of Extension

6. We recommend that the work of the Agricultural Extension should be limited to the following fields:-

(a) Popularization of good seed.

(b) Popularization of chemical fertilizers and farmyard and other manures.

(c) Wide spread use of plant protection measures.

(d) Crop sanitation measures.

(e) Adoption of improved cultural practices.

(f) Increasing the acreage under fruits, potatoes and other vegetables; expansion of high income crops like ground-nuts, and the distribution of such plants as castor in West Pakistan and kapok in East Pakistan.

(g) Extension of minor irrigation work in East Pakistan.

(h) Use of tubewells and percolation wells.

Some discussion of these duties will help to clarify the recommendations.

Seed

7. When the Corporations take over arrangements for the production and supply of improved seed to the Union stores, the duties of the departments in this matter will be limited to advising the farmer on suitable new seed varieties available and in persuading him to use them. But as the Corporations will take some time to build up adequate supplies of all seeds it may be possible in the interim period for the department to supplement supplies by arranging to have improved seed multiplied for local use by good farmers or cooperatives.

Fertilizer

8. In popularising the use of artificial fertilizers the main emphasis will be in the field of demonstration. It will be necessary to provide well conducted demonstrations in villages and make personal contacts with farmers and to maintain a steady pressure until they are convinced. The use of farmyard manure is fairly general, but its preparation in pits and the regular composting of all vegetable refuse requires further emphasis and demonstration. The use of dung cakes as fuel should be discouraged wherever any alternative fuel exists or can be economically brought in.

Plant Protection

9. Plant protection measures are becoming more and more popular but as yet are used in only a small part of the cropped area. These measures should be considerably increased and we feel, contrary to the recommendations in the Second Five Year Plan, that they should be the responsibility of the Extension Service of the Department of Agriculture rather than of a separate Plant Protection Section of these Departments. The

reasons for this recommendation have been given in Chapter 6. While Government may have to do the necessary spraying in the case of large outbreaks which have to be dealt with quickly to prevent or control epidemics, it obviously cannot afford to spray every field that is cropped. The farmers must be persuaded to do this work themselves and this persuasion and the necessary help and guidance should be the responsibility of the Extension Service. The supply of pesticides and spraying equipment will be the responsibility of the Corporations. During our tours of the country we were convinced that farmers were very willing to apply measures to control pests and diseases if they received adequate instructions and if supplies of chemicals and sprayers were made available. We suggest that a well trained Plant Protection Officer should be attached to each District Agricultural Officer to assist the men in the field to diagnose pests and diseases and to advise on remedial measures.

10. Protective campaigns on sugarcane, rice, cotton, and fruit trees have achieved a fair measure of success but there is need to plan control work on a much wider and more continuous basis. Past efforts have been too uncoordinated and spasmodic. In the case of serious outbreaks in large contiguous areas of crops it may be necessary to call in other departments in the district to assist and here the coordinating functions of the Deputy Commissioner or District Magistrate will be of great value. An important matter is to plan the procurement and distribution of materials and equipment well ahead of time.

11. In the Second Five Year Plan the targets for plant protection work have been fixed as percentages of the total areas of crops. We suggest that this be reviewed with the object of covering in addition to other crops in West Pakistan, the whole of the rice crop during the next three years, all the cotton in certain districts in 1961, and all the cotton in the wing by 1965, and the total cover of sugarcane where it is grown in large contiguous areas. In East Pakistan the cover of rice

should be gradually extended until it takes in the whole province by 1965. As this crop in many districts is grown in contiguous fields extending over many miles, aerial spraying should be particularly suitable. We suggest that the treatment of the seed of all staple crops should be expanded sufficiently to cover all supplies by 1965. We appreciate that this will mean additional expenditure both of rupees and foreign exchange but this should not be grudged as plant protection can yield tremendously high dividends.

Crop Sanitation

12. Crop sanitation measures have not received sufficient attention in the past. Last year orders were issued for the removal of cotton sticks by a particular date but were issued too late to be effective as was the order for the destruction of rice stubbles in areas affected by the rice borer. In future, orders should be given early in the season fixing dates for the carrying out of these operations. The Revenue Department, the National Development Organisation and the basic democracies should be made responsible for the enforcement of these orders.

Cultural Practices

13. The improved cultural practices on which the Agricultural Department should focus its attention are simple and only those which are likely to bring quick results and which can be demonstrated by less well trained workers should be selected. It will be necessary to arrange for supplies of suitable seed drills, especially for cotton and jute sowing, weeders and furrow turning ploughs. The manufacture of these implements along with others will be organised by the Corporation, and they will be made available in the depots throughout the country. The job of the extension worker will be limited to demonstrating their usefulness and persuading farmers to use them.

Horticulture

14. Extension of horticulture will also be a matter of demonstratic and persuasion. Until the supply of seeds and the nursery plants by the Corporation is built up the extension service will have to depend upon

their existing arrangements.

Minor and Lift Irrigation

15. The construction of minor irrigation works in East Pakistan is at present a responsibility of the Department of Agriculture. Until the Corporation moves into an area, or until a labour corps is organised, the department should continue to undertake this job. The same remarks apply to the use of tubewells, percolation wells and lift irrigation in both provinces

Extension Manual

16. We were surprised to find that no manual of instructions for extension workers exists to which they can refer when carrying out their various duties. We would recommend that such a manual be prepared early, giving simple but fairly detailed information on the matters discussed above. Revision and addition to keep the book up-to-date would have to be done from time to time. The provision of such a manual would enable workers to go ahead with more confidence and would eliminate the need for referring back small matters to senior officers. With the limited training and ability of the lowest grade of staff in the extension service, it is necessary to have available clear cut instructions in a convenient form.

Credit

17. We attach considerable importance to the introduction of supervised credit. It will not be possible, however, to introduce this outside the project areas and there it will be necessary to make temporary arrangements for credit to be available until the Corporation moves in. Suitable existing or new cooperative societies should be used for this purpose, but major dependence must be placed on the taccavi system. We recommend that taccavi loans and agricultural loans be made in kind from a union depot and that they be sanctioned on the recommendation of a member of a Union Council by the Union Agricultural Assistant or any other officer at the union level authorised for this purpose specially. This authorisation should be made on a printed application form, supplied at the Union Council headquarters. When this form is completed and sanctioned

it will be presented to the union depot and the storekeeper will issue the loan in kind. A copy of the form will then go to the local revenue officer who will be responsible for the recovery of the loan. When the Corporation depots are organised in the project areas it will be possible to expand this service. The depot may then also be able to provide implements on hire. Taccavi and agricultural loans must continue to be the main source of assistance in the case of widespread calamities.

18. We find that these loans cannot be freely issued to tenants who have no land. We suggest that existing rules and laws be amended so that, where he so desires a tenant can get supplies on credit and on the condition that the landlord and the tenant will together be liable to repay the loan after harvest in the same proportion as they share the crop. We see no reason why both parties who benefit from the use of fertilizer or better seed, should not pay in proportion to the benefit they receive.

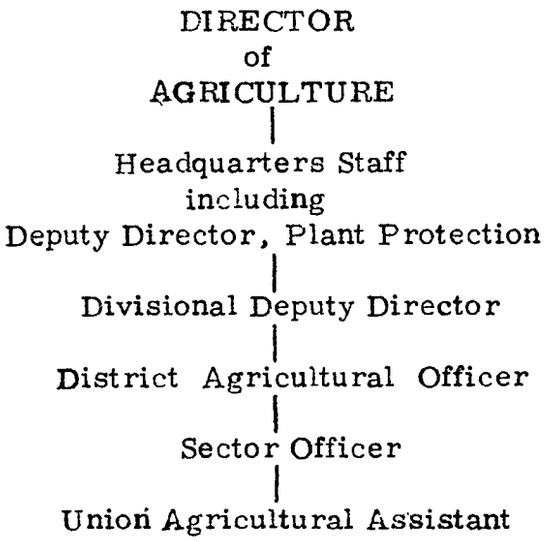
19. Farmers will need long term credit for development such as the installation of tubewells or the planting of orchards. Such loans would continue to be made by the Agricultural Development Finance Corporation and the Agricultural Bank either to individuals or to cooperative societies. The Agricultural Development Finance Corporation and the Agricultural Bank should normally cater for the larger farmers who are sound financially and can offer security in the form of mortgages. The smaller farmers would obtain credit from their own cooperatives and central cooperative banks. The latter in turn should receive more ample funds at a low rate of interest from the State Bank of Pakistan. The present investment of money in agricultural loans by the cooperatives is very low and special efforts should be made by the Cooperative Department and cooperative banks to make this investment more adequate to meet the needs.

Organisation

20. With operations confined to these items the agricultural extension

Figure II

PROPOSED AGRICULTURAL EXTENSION SERVICE



Service will be able to manage with men of limited training and capacity. It is, however, necessary that there should be a trained man in each Union to carry out all the duties that have been described here. We believe that the present system of recruiting Union Agricultural Assistants from matriculates and giving them one or two years' training will be adequate. Their pay scales, however, need to be revised as they are very inadequate even for this limited job which is still so important to the country. We recommend that they be brought on to the same pay level as a village worker in the Village-AID Organization. The Union Agricultural Assistant should be provided with a bicycle, an office and a housing allowance so that he can live in the Union where posted.

21. In our view the unit of operation for the agricultural extension service should be the district. The District Agricultural Officer (and we prefer this nomenclature to the existing nomenclature of Assistant Director and Extra Assistant Director) should be an experienced graduate of the type now operating as Extra Assistant Director of Agriculture in West Pakistan or Assistant Director in East Pakistan. As the principal agricultural officer of the district and the agricultural adviser to the head of the district, this officer should have an adequate status, corresponding at least to that of a Junior Class I officer of the Central Government. This would put him in a position to meet the other senior officers of the district on an equal level and enable the district officer to use him as a senior adviser. We consider that this officer should report to the head of the district on the operations of the programme and should be under his command for actual work in the field. He should, however, be administratively under the head of the department and apply to him for all technical assistance required. We recommend that he be given an assistant to be called Assistant District Agricultural Officer, who would be constantly on the move in the villages to see that the programme is being carried out and that bottle-necks are being removed, and to help to assess the performance of the field personnel. In addition a trained plant protection officer should

be attached to the District Agricultural Officer so that technical advice on plant pests and diseases can be more easily available. Both officers should have the salary and the status of a Class II gazetted officer. The District Agricultural Officer should have the powers to remove inefficient Union Agricultural Assistants, subject to review by higher officers. The District Agricultural Officer and his two assistants should have suitable transport to enable them to maintain a proper supervision of the field staff.

22. Between the district and the Union, there should be Sector Agricultural Officers each in-charge of about 10 to 15 unions. In West Pakistan, this officer will take the place of the present Agricultural Assistant, and in East Pakistan that of the Thana Agricultural Officer. It will be his function to keep the Union Assistants on their mettle and to make appropriate recommendations on any difficulties that may be encountered, for example, in the field of supplies. We suggest that his salary should be in the scale of Rs. 200 - 500 just below the provincial Class II level, but adequate enough to attract agricultural graduates. He should be equipped in accordance with local conditions either with a horse, a motor-cycle or a bicycle. For the purpose of maintaining a horse, he may be given a horse allowance as in the case of Naib Tahsildar in the revenue service in West Pakistan. He should be provided with an office and with housing facilities in the area within his jurisdiction.

23. Under the present administrative arrangements in two provinces, the Commissioner of a Division has been made the centre of administrative activities. A division, however, is too large to be a focal unit for the type of agricultural programme we have outlined. An agricultural officer at the divisional level is, however, necessary to supervise the district work, assist the Commissioner in the discharge of his developmental responsibility and report on the adequacy of the district staff. This officer should be a supervisor only and should not be involved in executive duties. He continues to be designated Deputy Director and be placed in a grade equal to that of a Senior Class I Officer of the Central Government. He is already

provided with transport and office accommodation.

24. The direct responsibility for the technical side of the agricultural programme and administration above the district level will be in the Directorate. The Director should be assisted by a suitable number of Deputy Directors.

25. We conceive of the agricultural extension service as administered from headquarters but with the district as the operational unit. The largest possible delegation of powers must therefore be made to the District Agricultural Officers. The Deputy Directors at the divisional level would be supervisors and not executive officers but will be kept fully in the picture both by headquarters and by the districts. The District Agricultural Officer must be well equipped to organise and supervise the extension work. The Sector Agricultural Officer will be incharge of men in the field and on his enthusiasm and efficiency will depend the success of the programme. The selection and training of this grade offofficer, therefore, will be a matter of great importance. We believe that an organization of this type with the functions mentioned above should be able to make an effective impact on production until the time when the Corporation moves into any particular area.

Financial Implications

26. It is necessary to point out here that the extension service suggested above is at nearly the same level as the sanctioned strength in East Pakistan. In West Pakistan the number of union assistants needed will be much larger than the existing strength, but as the responsibility for plant protection will be placed on the extension service, the existing field assistants of the plant protection service will be absorbed into the extension service, and so will considerably reduce the gap. Here the numbers of Agricultural Assistants and technicians and field labourers provided for in the Second Five Year Plan is, however, very large. Additionally there will be no extension staff of the Department of Agriculture in the project areas. It is possible, therefore, to conclude that the expenditure

envisaged for expansion and higher salaries in Extension Service of the Department of Agriculture will be very near the monies already allocated.

Pay Scales in Other Departments

27. We have suggested new pay scales and facilities for the agricultural extension service. The reasons which compelled us to do so also apply in the case of other allied departments. We therefore recommend that the pay scales of the staff in the departments of Animal Husbandry, Cooperative Societies and Fisheries should be brought to a level equivalent to those suggested for the agricultural extension service. Scales in departments such as the Departments of Forests and Central Department of Plant Protection are already higher and need only be revised where they are below the level suggested for agricultural extension service.

Responsibilities of Various Departments

28. With the expansion of the agricultural extension service it is necessary to define the responsibilities of other departments so that overlapping is eliminated.

The Revenue Department, The National Development Organisation and the Basic Democracies. 1

29. Recent decisions, taken on the recommendations of the Provincial Administrative Reorganisation Committee, have placed the responsibility for development largely on the Divisional Commissioners and on the Deputy Commissioners and District Magistrates. Earlier we had expressed our opinion that the Revenue Department is already overwhelmed with work and cannot possibly take on the additional heavy task of intensive agricultural development. But in the areas where the Corporations are not operating, we see no reason to ask for any change in the existing arrangements requiring the divisional and district officers to supervise an

1. The General Administration Department in East Pakistan carried out similar functions as the Revenue Department in West Pakistan but it is proposed to change it to a Revenue Department. Remarks in this section apply to both.

and coordinate the work of all departments. We consider that in non-project areas the district agricultural officer should report to the Deputy Commissioner generally on progress of the programme. While technically and administratively the extension service should be answerable to the head of the department, the District Officer's right to be kept informed and his right to supervise the work must be recognized. When progress or the work of the staff is not satisfactory he must initiate action to have matters put right. The same arrangement should operate at the divisional level.

The District Officer has been given extensive powers over the National Development Organization, which is the administrative and development wing of the Basic Democracy Organization, and over the Union, Tehsil/Thana and District Councils. He is thus in a position to ensure liaison between these and the Department of Agriculture and to ensure that they assist in creating a genuine atmoshphere of receptivity towards the work of the Department. This could help particularly in such matters as crop sanitation and the eradication of common weeds such as 'Pohli' and the water hyacinth.

Land consolidation must continue to be the responsibility of the Revenue Department. Compulsory consolidation has been introduced in West Pakistan and we have recommended that this should also be done in East Pakistan. The Revenue Department has undertaken to reassess land revenue at the same time and if the proposals, which we are making later for a change in the basis of land tax are accepted, the task of reassessment will not be burdensome. While appreciating the need for land consolidations, and, for relying ultimately on some means of compulsion to attain this, we recognise that hasty action may not be conducive to proper redistribution of land, and that the wishes of the minority should not be lightly ignored. The basic democracies may be given the responsibility for enlisting the cooperation of the farmers and should have at least a consultative voice in any decision involving compulsion. Wherever

possible, consolidation through the formation of cooperative societies should be encouraged, and where a successful cooperative organisation has been formed for this purpose it should not be subsequently disbanded, but should be used to provide supplies, marketing services and perhaps management. We believe also that the Agricultural Development Corporations should be consulted on land consolidation proposals so that the project areas receive priority. The actual work of consolidation should be carried out in such a way as to provide a maximum contribution to production.

Village-AID

30. We have discussed earlier what we consider should be the main function of Village-AID; that it should confine its work to the fields of community development, to awakening interests in all development matters, to giving publicity to and carrying out propaganda for improvement schemes and to giving assistance in such things as public health and communications where there are no departmental representatives at the Union level. It should not however, take any executive part in agricultural development work which should be the function of the extension service of the Department of Agriculture. Village-AID can be of great help to agricultural progress by creating a community spirit and stimulating self-help and an urge for development. We feel that close cooperation between Village-AID and the Department of Agriculture is very necessary if effective progress is to be made. There will be an advantage in making the Village-AID aware of agricultural plans and activities and in giving agricultural and corporation staff some training in Village-AID academies.

Department of Irrigation

31. We are recommending that the present method of charging for irrigation water according to the type of crop grown be replaced by a charge on a volumetric basis. This would eliminate the need for the existing duplicate system of canal and revenue patwaries and the Irrigation Department would become an entirely hydro-engineering service,

responsible only for providing a proper amount of water at the canal outlet points. It would continue to be responsible for maintaining irrigation canals in proper order and keeping them clean.

Animal Husbandry Department

32. We recommend that the functions of the Animal Husbandry Department be confined to veterinary work except that in the immediate future the management of stock and breeding farms will have to continue to be entrusted to veterinarians, a number of whom have received special training abroad in breeding, feeding and management of livestock. We have already recommended that these farms should be taken over by the Corporation. They would continue to supply improved bulls for all areas and for all artificial insemination centres. In non-project areas the artificial insemination work and the distribution of studbulls would continue to be a responsibility of this Department.

During our visits to rural areas our attention was frequently drawn to the very high losses from disease amongst livestock. Even when major epidemics do not occur, disease takes a heavy toll. The department, which may take the name of Animal Science or Animal Health, therefore, has a sufficiently big task in preventing and curing disease. As already indicated veterinary hospitals are few and far between and most are poorly equipped and poorly supplied with drugs and vaccines. Veterinarians are inadequate in number and are given very poor facilities for carrying out their work. A very great strengthening and expansion of the department is needed if the objective, which we recommend, of a properly staffed and equipped hospital in each union is to be attained in the foreseeable future. The proper and timely supply of biologicals to the present staff is one of the points requiring early attention.

Biologicals for prophylactic work and for anti-epidemic campaigns are now being manufactured locally, some by the Provincial Departments of Animal Husbandry and some by the Centrally controlled

Pakistan Animal Husbandry Research Institute. While we feel that ultimately the manufacture of such supplies should be done by private enterprise, we consider that meantime it should be handed over entirely to the Provincial Departments. The Centre should undertake the setting of standards for all products and organise an inspection service to see that these standards are observed. With inspection being administered by a body independent of the producer better control and higher standards should be ensured.

Department of Cooperative Societies

33. We have previously expressed the hope that the cooperative movement will ultimately become a most important instrument in the production drive and have discussed how this might best be achieved. Here we consider only its functions in the non-project areas but first would point out the need for extending and improving the training, both of the staff of the department and of the societies and of the participants in cooperation. Training should cover not only cooperative theory and accounting but also business and farm management. We understand that application is being made to the Special Fund of United Nations for further assistance in this matter. We would, therefore, confine ourselves to emphasising the need for an early start in this direction.

A certain amount of confusion exists at present in the cooperative field and militates against the effective use of cooperative societies in a production drive. The Cooperative Societies Department has established both on its own initiative and jointly with the Village-AID organisation a large number of societies which overlap in respect of both membership and functions. There are Credit Societies, Better Farming Societies, Better Living Societies and Development Societies, all handling some aspects of agricultural development in the same areas. Some types of societies have become moribund while others do not supply the benefits which a coordinated effort could bring. We recommend that a careful review be undertaken to eliminate moribund, overlapping and financially

un-sound societies and to ensure proper registration and classification of viable societies. Existing societies should be classified not simply on the basis of their financial position but also on the basis of their capacity for improving production and farmers incomes.

The Department of Agriculture should take more interest in the large number of existing farming societies than they are doing at present. The societies consist of groups of farmers who should be easily guided to adopt modern scientific methods, who can make threir own credit arrangements, obtain supplies in bulk and arrange the distribution of such supplies and who can also make arrangements for the joint ownership of such implements as individuals find too costly to buy. If the best use is to be made of these and other cooperative societies close liaison between these two departments is obviously necessary and it is here that the position of the head of the district as a coordinator of development would be extremely useful. Though the greatest emphasis on cooperative development will be in the project areas, much can be done in other areas to improve the present position.

Government Agricultural Credit Institutions

34. We have envisaged the continuing functioning of central institutions like the ADFC and the Agricultural Bank which we understand are to be amalgamated. We are in favour of this amalgamation. We envisage that, with an expanded credit organisation under the supply wings of the Corporations, the main function of these institutions would be the issue of loans to the larger farmers and loans on land security to all farmers. Small farmers can best be given assistance through Cooperative Societies or through Cooperative Banks. In these cases the rate of interest will have to be such as to enable societies to accept the loans. The ADFC have recently been authorised to issue loans on the security of crops. As previously stated we do not consider that this can be satisfactorily undertaken on any large scale without the method of supervision to be provided by the Corporations. We think that in project areas this duty should for the most

part be left to the Corporations and that the ADFC should continue its activities to issue loans to men of property, although there will no doubt be circumstances in which the Corporations and the ADFC would work out a joint policy.

Department of Fisheries

35. As stated earlier marine fisheries are handled by the Central Department of Fisheries and inland fisheries by the two Provincial Departments of Fisheries. We consider that marine fisheries should continue to be the responsibility of the Centre. As regards inland fisheries, at present the Board of Revenue in East Pakistan and the Department of Revenue in West Pakistan are incharge of fishing leases in rivers, lakes and ponds. This arrangement appears to have been made primarily because of short term considerations of revenue rather than the long-term objective of expanding production. We recommend that the entire work of surveys, development and leasing of all inland fisheries should be given to the Provincial Departments of Fisheries. This would ensure that surveys, development, and exploitation went hand in hand.

Farm fisheries are very important in East Pakistan and are of growing importance in West Pakistan. We consider that in non-project areas they should continue to be the responsibility of the Department of Fisheries.

Forest Department

36. We do not recommend any changes in the present set up outside the project areas. Our views on forest policies are set out in a later chapter.

Central Plant Protection Department

37. The Central Department of Plant Protection is a well staffed organisation, at least, at the higher levels. Included in its responsibilities are international quarantines, international liaison and execution of locust control work both in and outside Pakistan. It has an aerial wing and a transport wing both set up primarily for locust control work but expanded

and now made available for other plant protection work. The Department undertakes the procurement from local or foreign sources of all pesticides and equipment necessary for campaigns and routine work and is responsible either directly or indirectly for much of the protection work with hand operated sprayers on the farms.

If our recommendations regarding the Corporations are accepted its work will be greatly curtailed. The procurement and distribution of pesticides and plant protection equipment will be taken over by the Corporations and the field work, apart from aerial spraying, will be handled by the Corporations in project areas and by the extension service of the Department of Agriculture in other areas. The Central Plant Protection Department will continue to perform the other functions mentioned above.

Food Department

38. With the introduction of the new policy regarding wheat, direct government distribution of foodstuffs is limited to sugar and rice in a few areas. In a later chapter we are making recommendation on food and pricing policies but the Food Department does not otherwise come directly into any production drive.

Public Works and Electricity Department

39. In non-project areas we do not suggest any changes in the responsibility for building programmes. This should remain with the Public Works Department. As regards the distribution of electricity we feel that higher priority should be given to agriculture and that all unnecessary delays in the connecting up of power to tubewells or other wells should be eliminated.

40. We believe that these suggestions will enable a more coordinated effort to increase production. In the next chapter we turn to the allied subjects of Research, Training and Education.

Donated By:-
Mr. Salim Ullah Fahmi

CHAPTER 9

RESEARCH, EDUCATION & TRAINING

Research

Importance & Scope of Research

1. Throughout this Report we have emphasised the importance of research and pointed out that it is the foundation of all agricultural development. New varieties of crops are being evolved which are more responsive to fertilisers, earlier maturing, more resistent to disease and pests, better adapted to particular climatic and soil conditions and thus able to produce much more. Hybrids have been developed which have increased yields almost miraculously. Studies on soils and fertilisers have produced new techniques of fertiliser use through which yields can be considerably increased. The use of trace elements in plant nutrition has made it possible to raise yields still higher. The radio-active isotopes and radiation biology have provided new instruments for studying the genetical behaviour and physiological processes in a plant more easily and thoroughly. The study of disease cycles and their origin and the finding of the means for their eradication has been made simpler. Animal breeding programmes are being developed to produce stock which matures quickly and gives better yields of meat and milk. Scientific processing has made possible the preservation and movement of agricultural products over longer periods and greater distances than ever before. Research on these and other agricultural problems should be pursued vigorously in this country to provide results which can be applied under local conditions.

2. While research in Pakistan can justifiably claim credit for an appreciable share of development, that contribution is woefully small compared to the needs of the country. Lack of organisation, paucity of funds, shortage of technical personnel, and inadequate facilities and equipment have stood in the way of better progress although efforts are continually being made to remove the deficiencies. The country needs

and expects a far greater effort in agricultural production and that effort will not produce the desired results if it is not based on and backed by a strong and effective research organisation.

3. In a previous chapter we have indicated the weaknesses of the present research set-up. Funds so far given to research are a very low proportion of the total resources of the country and even of the total resources devoted to agricultural development. A planned approach to research is lacking and in particular, there is no coordination among the various departments and agencies handling research, or even among the various sections of the same department. This has left serious gaps and produced wasteful overlapping and sometimes duplication. There is not enough continuity in research and the carrying out of particular work too often depends on individual efforts. A weakness inherent in the present situation is that the Ministry of Food & Agriculture, the Food & Agriculture Council of Pakistan, the Provincial Agriculture Departments, and the specialised Research Agencies like the Cotton and Jute Committees, all focus on different aspects of research in certain common fields without their being any arrangement for effective coordination. Thus, the responsibility of the Government to back agricultural development by efficient research is not being adequately discharged.

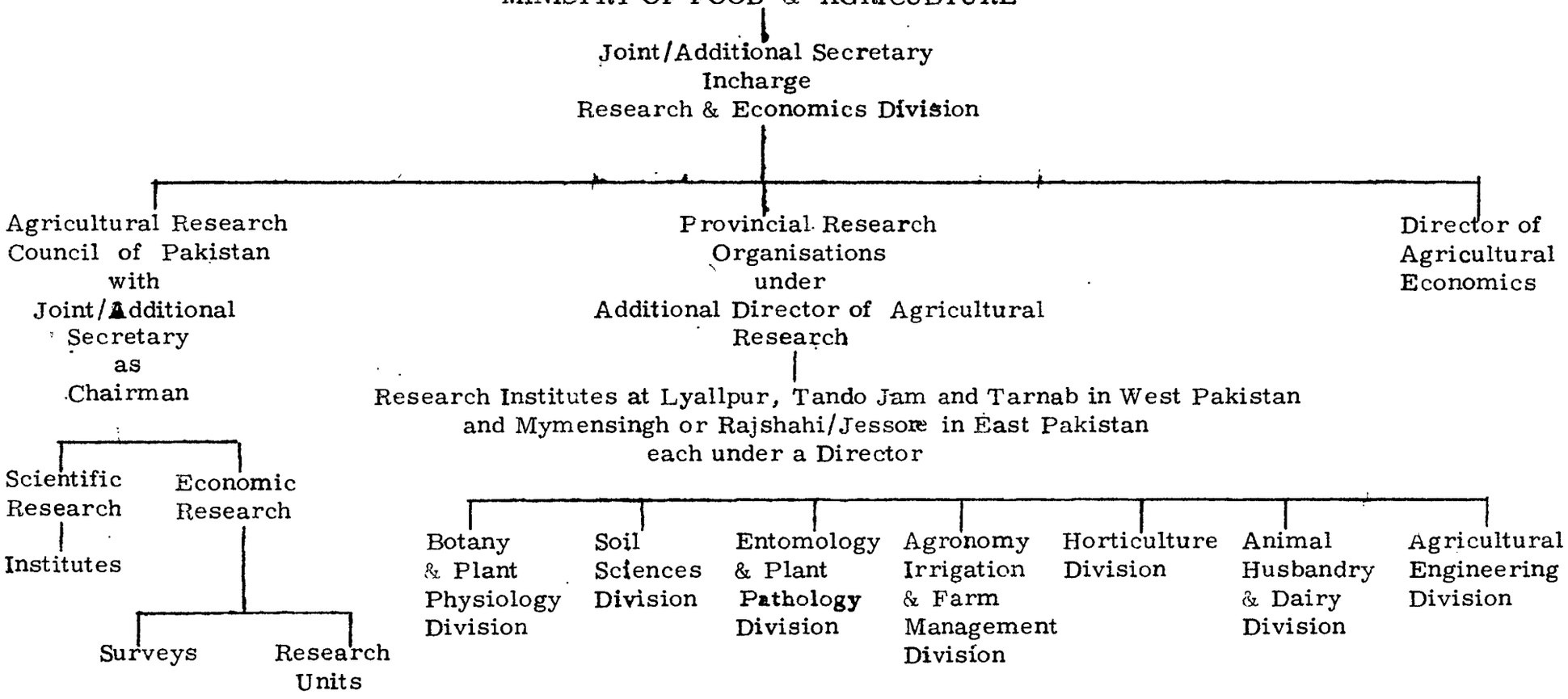
Central responsibility and support to agricultural research

4. It is of the utmost importance that agricultural research should be planned on a national basis to meet the national need for increased production in the most effective manner. The Central Government which has the funds, and the Ministry of Food & Agriculture which is charged with agricultural development, must assume direct responsibility for this work. Research is a continuous process and the Central Government's responsibility must be conceived as a sustained and comprehensive obligation which cannot be discharged in a piecemeal manner.

5. The Central Government must provide adequate finance for

Figure III

Proposed Research Organisation



research. The sums required will increase as research develops but initially it is considered that a sum of between ten and twenty million rupees annually, in addition to the capital cost of new institutes, will be required. We recommend that this should be a Central grant and should not be related to cesses. We further recommend that, so that continuity of programmes can be ensured, this annual grant should not lapse at the end of the financial year. As programmes develop, additional funds will have to be provided.

The revenue realised from cesses should be amalgamated with general revenues, and the savings in the provincial budgets, as a result of provincial Governments having less obligation to finance agricultural research, should be used for strengthening agricultural education, training and extension work. Only that portion of agricultural research which is carried out as part of higher education should be financed mainly from the provincial revenues. It is generally agreed that research and education should be closely associated in institutions of higher education so that teachers in these can keep themselves abreast of modern development and pass on their knowledge to students. But the educational institutions should not be saddled with the responsibility of tackling all the diverse research problems which aim at the increase of national production. These problems must be tackled in all their aspects by specialised Government research organisations. We envisage that the Agricultural Development Corporation will provide funds for carrying out specific research projects by such organisations, and that the same facilities will be available to private organisations which want to sponsor research in specific fields.

A Division of Research in the Central Ministry

6. To enable the Central Ministry of Food & Agriculture to carry out its responsibilities of supporting and supervising research, we recommend that a separate Research Division be created in the Ministry. This Division should also be responsible for agricultural economic studies.

It should be headed by a Joint/Additional Secretary who should be an agricultural scientist or an agricultural economist of standing and repute.

7. We mention here that one of our Members, Mr. S.G. Kabir, feels strongly that, apart from this Division for Research, there should be another Division for Agricultural Economics and Marketing Information. While the rest of us are not opposed to this view, we doubt if it would be justified at this time. Later, when the work increases, it may be advisable to provide a separate Division for Agricultural Economics and Marketing, in which case, the Research Division should be headed by a scientist and the Economics Division by an economist.

8. Under the general guidance of this Division, we recommend that research work be divided between the provincial organisations for research and a Research Council set up on the lines of the present Food and Agriculture Council of Pakistan, suitably re-organised and expanded. The Joint/Additional Secretary in charge of the Division would be the Chairman of this Council and would be its chief executive. In the case of provincial research organisations he would be responsible for drawing up, in consultation with the provincial organisations, a programme of research on the basis of which allocations would be made to the provinces. This programme should be drawn up well ahead of time in order to avoid last minute delays and improvisations. The funds allocated to the Division would be divided into two parts - one going to the provincial organisations and the other to the Council. The funds allocated to the provinces will be administered by the provincial organisations in the manner discussed below. The funds allocated to the Council will be administered by that body, which should function as an autonomous unit under its own charter and not as a body registered under the Societies Act as at present.

9. While a clear demarcation of functions between the two sets of research organisations is difficult to draw, we envisage that the Council will be basically responsible for all long-term research of national

5. Principal Research Specialists, or Heads of Divisions. Rs. 1000 - 1500

6. Heads of Research Institutes. Rs. 2000

7. Additional Directors of Research. Rs. 2500

We recommend that research workers of proven ability be allowed to remain in service beyond the normal age of retirement so that the country may continue to benefit from their knowledge and experience. We suggest that arrangements be made to enable research workers to get some benefit from the adoption of the results of their research or for outstanding workers to get accelerated promotion, and that research work of special merit continue to be recognised through Presidential awards. Adequate housing or rent allowances should be provided to enable research officers to keep their families with them. Such perquisites and salaries would attract better people and give them opportunities for advancement. If at any time higher scales of salaries are sanctioned for research specialists in other fields, the suggested scales for agricultural scientists should be revised correspondingly. The scientists in agriculture should be treated equally with the scientists in fields such as industrial research, atomic energy or medicine. Salary scales in the Council and the provincial organisations should be on the same level so that unnecessary shifts in personnel are prevented.

Organisation of Research in the Provinces

11. Under the headquarters' organization, we suggest that research in the Agriculture Departments be conducted in three Research Institutes in West Pakistan and in two in East Pakistan. We are suggesting these provisions as the climatic and ecological conditions are very different in the northern, central and southern regions of West Pakistan, and the western and the eastern areas of East Pakistan. We envisage that the headquarters of the research institutes in East Pakistan will probably be at Mymensingh and at Rajshahi, Rangpur or Jessore and in West Pakistan at Lyallpur, Tando Jam, and Tarnab. Lyallpur and Mymensingh

will perhaps be the headquarters of the Agricultural Universities, and therefore one of the Provincial Research Institutes should be located near each of these places. Each institute will be in the charge of an Institute Director. Additional Directors of Agricultural Research would be in general administrative control of these institutes, they would maintain liaison with central and other governmental institutes and each would coordinate the work of the research insitutes under his control. The Institute Director would be responsible for the administration of research programmes within the jurisdiction of the institute. It is important that each Research Institute should have ample land and adequate facilities in the form of buildings, libraries, equipment, irrigation, and where necessary sub-stations. Each institute should have a separate budget and once that is approved the Institute Director should have powers to sanction expenditure in accordance with and within the provision of the budget. The following Divisions are proposed for each institute:-

1) Botany and Plant Physiology,

2) Soil Science including agricultural chemistry,

3) Entomology and Plant Pathology,

4) Agronomy, Irrigation and Farm Management,

5) Horticulture,

6) Animal Husbandry and Dairy Farming,

7) Agricultural Engineering.

Each Division will have a suitable number of Specialists, Assistant Specialists, Research Officers and Assistants. The sub-stations, which will be used mostly for field trials and research necessitated by local climate and soil differences, will be staffed with officers at suitable levels. The Head of each Division of the Central Research Institute will have control over the programme of work of the officers doing that type of work at the sub-stations.

12. The three Institutes in West Pakistan and two Institutes in East Pakistan, together with the required number of sub-stations, should

continue, or immediately undertake, research on (1) plant breeding to develop varieties which are disease resistent, are more responsive to fertilisers and give better yields generally, (2) crop response to various dosages and combinations of fertilizers, (3) optimum water requirement of various crops, (4) crop rotations for different areas including permanetly irrigated areas and areas in process of reclamation, (5) mixed farming and animal nutrition to improve milk and meat yields and draught power, (6) disease and pest control, (7) improved agricultural implements, and (8) better cultural practices. We would recommend regular reporting on the result of research so as to promote application of these results in the field and to provide the basis for decisions on further research. Research programmes should be laid down for a number of years in order to ensure continuity, and once such programmes receive Government approval annual budget allocations should be sufficient to carry them out.

13. Whether research is carried out by the Agricultural Research Council or by the strengthened provincial research organisation, adequate liaison will have to be established between research and extension so that there is a steady two-way traffic. The problem of liaison is more or less the same whether research is centrally or provincially administered. An effective liaison can be ensured if Research Extension Liaison Committees, consisting of research workers, extension workers and farmers, are formed at every level - Council level, Directorate level, Institute level and sub-station level. These committees should initially approve the programme of research at various levels and periodically review and assess the results and see that they are made available for speedy extension to the farmers. Without such arrangements research may not meet the needs of the farmer even if research and extension are placed under one control.

14. We recommend that other departments (such as Irrigation, Veterinary Services, Fisheries and Forestry) in the provinces maintain

similar research institutes, as required, on a smaller scale. We do not suggest the provision of an Additional Director for Research in these departments but an officer of suitable rank in each department should be placed in charge of research. Their programmes should be financed by the Central Ministry of Agriculture on a continuing basis.

15. When the Agricultural Development Corporation starts working it will have under its control a number of cattle breeding farms and seed multiplication farms. We envisage that portions of these farms will be used for research of all types including a certain amount on animal breeding and feeding, and that this will be done in close cooperation with the research organisations. The Corporation will be closely linked with the research organisation for all its research needs and will undertake field trials in its area as part of programmes of the research organisations.

16. We understand that some research is now being undertaken which is coordinated by the international organisations like CENTO. Where special institutes have been set up for this purpose or are being used for this purpose, they should, as far as possible, be placed directly under the Research Division. At present the Malir Animal Husbandry Farm is being exclusively used for international research. We hope that it will be possible to carry out such international research programmes at the research institutes of the Central or the Provincial Governments.

17. We have already indicated that the Corporation will need research officers in its project areas to carry out research on special and immediate problems of such areas. As suggested earlier, we intend that such research experts be seconded to the Corporation from the existing research organisations, or those to be created, so that continuity of liaison is maintained.

Agricultural Research Council

18. We recommend that the Agricultural Research Council should

consist primarily of scientists and research workers drawn from all sources such as Government Departments, Universities, other Scientific Organizations and from among private individuals. We have suggested that the Council should have a whole-time Chairman who would be ex-officio Joint/Additional Secretary in charge of Research and of the Economic Divisions of the Ministry of Agriculture. The funds placed at the disposal of the Council will be budgetted for and allocated under the orders of the Council or its Governing Body. The Council would also advise the Joint/ Additional Secretary on the Research Programmes to be undertaken by the provinces.

19. We recommend that separate institutes for commodity research such as the Pakistan Central Cotton Committee and the Pakistan Central Jute Committee should cease to exist as separate entities, and should be amalgamated with the Agricultural Research Council. In view of the special importance of jute and cotton as foreign exchange earners their interests must be specially looked after by technical committees of the Council constituted for that purpose. Research work on these crops, must include the determining of such qualities as staple length, tensile strength, spinning qualities, etc. The Cotton Committee has an excellent technological laboratory in Karachi and the Jute Committee is in the process of organising a similar laboratory in its Dacca Institute. While technological facilities are required for testing of fibres, research in cotton textiles, treatment of fabrics, and new and extended uses of jute may well be handled by the Council of Scientific and Industrial Research. The demarcation of functions between the Agricultural Research Council and the Council of Scientific and Industrial Research should be carefully examined.

There is a Tea Research station in Sylhet, East Pakistan, attached to the Pakistan Tea Board under the Ministry of Commerce. Tea has special problems and there may be a case for a separate institute under or even outside the Council, but we feel that there will be an advantage in bringing this Tea Research Institute under the Council. We also think

that there should be an Institute of Marine Fishery Research and that the Council should set it up.

20. We recommend that the work of the Council be divided into scientific research and economic research. Scientific research would cover researches on land, crops and livestock as well as the technological testing of the qualities of any new agricultural or livestock product. The economics section would coordinate the collection of statistics, make studies of prices and incentives and undertake market surveys. In its work it should utilise the services of agencies like the Central Statistical Office, the Institute of Development Economics, Boards of Economic Inquiry, and Universities. We propose that a Board of Economic Inquiry be established in East Pakistan and that the existing one in West Pakistan be strengthened.

21. To improve the present situation where the results of research are not being properly collated, published or utilised, a separate section of the Council should be put in charge of evaluating and publishing the results of all research undertaken by the Council. It could first evaluate the results so far achieved and consider the proper method of their dissemination to farmers. In this section for evaluation the Agricultural Research Council, the Ministry of Food & Agriculture, the Provincial Research Organisations, the Provincial Extension Departments and the Agricultural Development Corporation should be represented. This is extremely important as in the past some useful results achieved have remained in oblivion.

We consider that a national register of trained Pakistani research workers in agriculture and allied fields should be maintained by the Council. This could ensure that the best possible use was being made of these men with specialised training.

Education

Introduction

22. In the previous chapters we have made it clear that if Pakistan's agriculture is to emerge from its present unsatisfactory state, agricultural development and the supporting research activities must be organised both on a more intensive and a more extensive scale. This will make a heavy demand on scientific and technical personnel, as no effective programme of research, extension and development can be carried out without a large body of professionally qualified agricultural scientists and scientific agriculturists. Men trained in agriculture will be needed at every level, from the highly qualified research worker to the extension agent working in the field with the farmers. Agriculture has long been recognised as a science and it is now generally appreciated that major advances are possible only through the application of scientific knowledge. It is also recognised that a sound system of education and training in agriculture and related fields is essential to economic progress and development in countries having a predominantly agricultural economy. It is evident that the pace of future development here will depend, in a very large measure, on how fast agricultural education and training can be expanded to meet the needs of an expanding development programme and also how quickly it can be re-orientated to suit the special needs of the situation.

Existing facilities and future needs

23. There are at present three agricultural colleges in West Pakistan and one in East Pakistan. The total capacity in the West Pakistan colleges is 375 and in the East Pakistan college 40. Allowing for normal wastage, the present annual outturn capacity will not be much above 200. The facilities for post-graduate studies in these colleges are also extremely meagre.

The number of agricultural graduates needed for the execution of the programmes recommended in this Report or even for the more limited programmes in the Second Five Year Plan is such that the existing facilities for higher agricultural education are obviously grossly inadequate.

In the Second Five Year Plan the need for agricultural graduates is estimated at over a thousand. To meet this great and immediate need, it will be necessary to set up at once additional colleges and to expand, where possible, the existing colleges. The matter is so urgent, particularly in East Pakistan, that we suggest that some of the existing Arts colleges might be converted into agricultural colleges, if it is possible to acquire enough adjacent land for practical training. Similarly buildings which are not immediately required for any programme might be used to house temporarily new colleges if the necessary land for farm training is available nearby. The situation in East Pakistan is particularly desperate because of the very low capacity of the only College there and of the very large requirements for trained men in the immediate future. The position may be further adversely affected by the proposal to shift the Dacca Agricultural College from its present site to a new site at Mymensingh. In view of the urgent need to continue, and to increase, the degree courses without interruption, we recommend not only that the College continue working in its present location till the Agricultural University is finally established, but that its admission capacity should be raised to at least 100 immediately. This could be done, if necessary, by erecting temporary buildings and holding classes in double shifts.

Character of the Degree Course

24. There is no uniformity in the duration of courses or standards of instruction in the different agricultural colleges of the country. In the Lyallpur and Tandojam Colleges, the course is of four years duration after matriculation, whereas in the Dacca college it is three years after I.Sc. In Peshawar, where the College of Agriculture is an integral part of the Peshawar University, the course is of five years' duration after matriculation. The Education Commission has recommended that the length of the graduate course in agriculture should be five years after matriculation. We are in general agreement with the Education Commis-

sion's recommendations regarding the entrance requirements, the duration of course and the broad principles on which the courses are to be framed, and hence do not consider it necessary to discuss these matters here in detail. We believe that a uniform five year course after matriculation in all colleges, with provision for specialization in the final year and with a reorientation of the course so as to include extension techniques, public relations and to some extent social sciences and humanities, will put agricultural education on a sound basis and will satisfy the requirements not only for general agriculturists, but also, after the necessary post-graduate training, for specialists in the different branches of agricultural science. Because of the great shortage of agricultural graduates in East Pakistan we would, however, recommend that the existing system in East Pakistan by which Intermediates in Science are admitted to a three year degree course, be continued until the proposed five year course has been operating for two years. In West Pakistan where matriculates are now admitted to four year degree course, the five year course should be introduced straightaway.

25. In the case of the two Animal Husbandry Colleges (Dacca and Lahore), where the degree course is already of five years' duration after matriculation, we do not suggest any change in the present system except that the colleges should be expanded to meet the growing requirements for Veterinary graduates. The establishment of the Agricultural Universities of which the Faculties of Agriculture and Veterinary Science will be constituent units, will necessitate a careful drawing up of the curriculum and syllabi both of the new university and of the existing colleges of animal husbandry and agriculture. It is considered that most of the animal husbandry should be taught in the agricultural courses and that the present Animal Husbandry Colleges should teach mostly veterinary sciences with a limited amount of animal husbandry only. The Mymensingh Animal Husbandry College has now, in addition to its degree course, a three year diploma course (after matriculation) in Animal Husbandry. We recommend

that this should continue until provision is made for sufficient number of students to take up the five year degree course.

26. The Colleges of Agriculture and Animal Husbandry are now under the administrative control of the provincial departments though they are affiliated to the universities for regulation of academic work (an exception is the Peshawar Agriculture College which is part of the University). This dual relationship and control creates a number of administrative problems. Further, the college staff do not enjoy the same status or salary as university staff and they are liable to be transferred to other branches of their departments. This lower ranking and liability to transfer is not conducive to a high standard of academic work.

27. The West Pakistan Government has adopted a system whereby each Agricultural College has a Board of Governors. We consider this system to be useful and recommend that it be adopted for all agricultural educational institutes until the Agricultural Universities take over.

Agricultural Universities

28. The Education Commission has recommended the creation of an Agricultural University in each wing. These Universities are expected to bring together in one campus higher teaching in agriculture and all allied subjects such as, animal husbandry, agricultural engineering, fisheries, forestry and cooperation. This concept of higher agricultural education, in which the basic and applied sciences related to agriculture and allied fields, will be taught in one institution, will help to bring about the desired harmony and cohesion among the workers, and will enable courses to be better balanced and adjusted. It could also tone up considerably the standard of agricultural education and produce first rate agriculturists, agricultural scientists and technicians to take up their place in the agricultural development of the country. If the Agricultural University is

granted full autonomy and is adequately financed. and if its staff enjoy the same pay and status as those in the other Universities, which we most strongly recommend, then research and education in agriculture will be encouraged and stimulated. We are in general agreement with the recommendations of the Education Commission for establishing an Agricultural University in each wing and with the general objectives underlying the proposal. We recommend that the principal faculties or departments in these Universities be :-

(a) Agriculture

(b) Animal Husbandry

(c) Veterinary Medicine

(d) Agricultural Engineering & Technology

(e) Agricultural Economics & Sociology (including Cooperation)

(f) Agricultural Education & Extension (including knowledge of communication media)

(g) Rural Home Economics

(h) Basic Sciences

(i) Social Sciences and Humanities

29. In order that the Agricultural University may not develop into a purely technical institute, divorced from general education, adequate emphasis must be given to the teaching of Social Sciences and the Humanities. Since the Universities will be teaching mostly subjects related to rural conditions and rural development, we are inclined to think that they should perhaps be called a 'Rural University' instead of an Agricultural University. As already indicated we consider that all the existing Colleges and Institutes in Agriculture, Animal Husbandry, and other allied subjects should be affiliated to these Universities, no matter where these colleges and institutes are situated. We further suggest that the Agricultural Universities be located at Lyallpur in West Pakistan and at Mymensingh in East Pakistan. In view of the fact that the present number of colleges is small, we consider that there should be no question of closing existing

colleges when the Agricultural Universities develop; there will be need for all to meet the country's requirements.

30. Earlier we have recommended that a seperate organisation be set up to carry out the main agricultural research work. We felt that this was necessary as there is such a great and urgent need for research of all types, fundamental and applied, that its confinement entirely to the universities would not meet the needs of agricultural development. We agree that the teaching universities cannot and must not be divorced from research, and consider that they should undertake such research as is necessary for the training of students, for the promotion of post-graduate studies, and to enable the staff to keep up to date with scientific development. It may also be possible to allocate special research problems to them.

31. We advise that arrangements should be made between the Universities and the Research Organizations to enable post-graduate students, in pursuance of higher degrees, to work in the laboratories and in the farms of the research organizations.

32. There is as yet no programme to give an agricultural bias to school education. Knowledge of agriculture and cooperation could be promoted in the primary schools through the operation of small market gardens and small consumer stores. In the senior schools agriculture, including animal husbandry and cooperation, should be included among the subjects for study. The Education Commission has already made a recommendation to this effect, and we suggest that a Committee be established to work out practicable proposals for implementing these recommendations.

33. While the education of the farmer in agricultural techniques is the object of agricultural extension work, we feel it is possible to teach the farmer some aspects of scientific agriculture and that this teaching would lighten the work of the extension staff. We suggest that consideration be given to the organization of short courses for farmers at district

demonstration farms and in model villages. Model villages are now being organized in the Punjab and some courses are being held at Lyallpur, but the system should be extended to the whole country. The Cooperative Department has a separate educational wing which arranges short courses for cooperative members at the district and tehsil headquarters from time to time. The Department of Agriculture and the Agricultural Development Corporation should plan similar courses, and, to make them attractive, the farmer might be paid a small allowance while attending them. This practice has been used to advantage in countries like Germany, where such agricultural courses are run during the winter months.

Training

Training needs of lower ranks of Extension Staff

34. A large number of trained men will be required to man the extension arm of the Agriculture Departments and the Agricultural Development Corporations. In the past very little attention has been paid to the quality and number of the extension workers at the farmer's level and as a result the teaching of the farmer has remained almost ineffective and has achieved little. With the intensification of effort in the field of higher agricultural education, it will be possible to turn out a larger number of graduates than at present, but the number will not be sufficient to enable graduates to be posted below the Thana or Tehsil level, nor may it be necessary or desirable to do so. At the lower levels practical men with less academic training will be required to help farmers in their day to day problems. These men must have a basic knowledge of the agricultural sciences and should have considerable practical experience in the methods and matters which they are demonstrating, otherwise they will not gain the confidence of the farmer. The training of this field staff to serve the lower ranks of the extension service, both of the Corporation and of the Agriculture Departments, thus requires very special attention and planning.

Diploma in Agriculture

35. In both West and East Pakistan there is a number of schools or training centres where agricultural extension workers are being trained. In the East Pakistan schools, matriculates are given a two-year course after which they are posted as Union Agricultural Assistants. In West Pakistan the course is of one year duration, the entrance qualification is generally matriculation and trainees on completion of the course are posted as Field Assistants. The number and capacity of the schools and the quality of the training imparted are not adequate to meet present needs. Schools visited were very inadequately financed and equipped in all respects to carry out this most important work. We strongly recommend that the whole question be reviewed and a comprehensive plan for the training of field staff be worked out. Our views are that the men selected for this training should be matriculates with a rural background. They should receive training for two years and on successful completion of the course should be awarded a diploma. The training institutes should be properly staffed and equipped and have adequate land for practical work. In the early stages, because of the urgent need of building up staff as quickly as possible, the course may be condensed and reduced to one year, with provision that these trainees will be given further courses later on when the personnel position improves.

Establishment of more agricultural schools

36. We have previously laid a great deal of emphasis on the need to put properly trained extension workers in direct and active contact with the farmer. We consider that there should be at least one trained man for every union council area and perhaps more in the intensive development areas of the Corporation. There are about 4,000 unions in East Pakistan and the number in West Pakistan, where they have been formed recently, will be of the same order. Intensive work on the 'five firsts' and on the more long term methods of increasing production will require large numbers of well-trained practical men if worth-while results are to be obtained. We would,

therefore, re-emphasise the need for a comprehensive training programme in both the wings so that at least by the end of the Second Five Year Plan, a trained extension worker is available for each union throughout the country. To meet this requirement a number of training schools will have to be started in the very near future. When the initial requirement of staff has been fully met, some of the schools could be used as centres for refresher courses or for training young farmers.

The existing untrained staff

37. Many of the existing workers in the lower ranks of the Agriculture Departments have not received the training that is now available in the Departments. In East Pakistan there is one extension worker in each union, but a large majority of them have had no agricultural training or experience as they were transferred from the lately abolished Jute Regulation Department. The present arrangement of giving them in-service training for about three months does not make them competent extension workers, particularly as a lot of them are now middle-aged and are not really interested in agricultural extension work. In West Pakistan also, especially in Sind, a large number of the field assistants is untrained and has not the necessary education and background to carry out their work in a satisfactory manner. We consider that the Jute Regulation staff in East Pakistan and the untrained staff in West Pakistan should be examined and the more promising of them who have a sufficient educational background and are capable of learning, given a training course of at least one year. The others should gradually be replaced by trained staff and transferred to posts requiring less technical knowledge and skills, for example store-keepers in the supply wing of the Corporation.

Extension training for the Corporation

38. Some special training will be needed for the staff employed by the Agricultural Development Corporation. It may have to make its own arrangements for special courses, but it could also utilise existing institutions of various departments, including Cooperatives and Village-AID.

We were specially interested in the training imparted by Village-AID Institutes, particularly in mass contact and communication methods, and feel that much of their curriculum could be usefully incorporated in the training of Union level workers in agriculture.

39. The existing cooperative training institutes appear to give the Inspectors and Sub-Inspectors a fair knowledge of accounts and cooperative theory but little or no training in Business Management or Farm Management. Here again it is essential that the training be broadened so that the men turned out will be able to contribute effectively to the agricultural drive.

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CHAPTER 10

NATIONAL AGRICULTURAL POLICIES

Introduction

1. National policies play a very important role in any planned economy and it is, therefore, necessary to consider those aspects of government policy which affect the developments which we wish to see brought about. In an earlier chapter we examined the economic factors and forces affecting the country and showed the importance of and the great need for a large increase in agricultural production. The final answer to the needs of an increasing population and a higher standard of living is likely to lie in industrialisation but it is obvious that this can only be brought about gradually and must be based on the build up of heavy industries such as steel production and engineering. The recently discovered supplies of natural gas are a tremendous asset as a source of power and also as a raw material for a fertilizer and a potential petro-chemical industry. At present, however, agriculture provides the only immediate hope of raising living standards, increasing employment and bringing about a general upsurge in the economy of the country. Moreover, a general raising of farmers' incomes would provide a very great internal market for the consumption of manufactured goods, a market which is almost a necessity for sustained industrial progress. The need for the earliest and fullest possible measures to build up the agricultural industry and so increase agricultural production thus cannot be over emphasised.

2. This chapter deals with changes which we consider are necessary to achieve the desired results. These changes are spread over a wide field and include matters of taxation and land tenure, where present system tend to stifle enterprise and initiative; problems of irrigation including salinity and waterlogging, where farmers as individuals cannot help themselves; policies on consolidation of farms, on the better use of surplus labour and on food and cash crops; matters of better marketing and credit systems and the greater encouragement of cooperation; and policies in animal breeding and management and in fisheries and forestry.

3. We do not pretend that these recommendations cover all fields; they deal only with those matters which we consider important.

Taxation and Tenures

4. Land taxation systems differ from area to area. In East Pakistan the East India Company made agreements with a large number of individuals, many of them farmers of revenue and, recognising them as owners of land, contracted that they pay a fixed assessment to government. In many cases the actual owner, the raiyat, was relegated to the position of a tenant with practically no rights. The wrongness of the situation was gradually realised and over the years changes were made to safeguard the rights of the raiyat. Under these changes he could not be evicted, unless he defaulted, and he had the right to plan his own land use. In spite of legal provisions, however, many abuses persisted and the raivat often had to pay more than he should have paid.

5. In 1951, the East Bengal State Acquisition and Tenancy Act changed the whole picture. Under this Act the Government became the owner of all the land; the raiyat retained his rights but paid rent to Government. This rent was fixed according to law and usage but action is now being taken to refix it at rates per acre according to the productivity of the land. The Government also assumed the right to take over any family land in excess of 33.3 acres, or 3.3 acre per member of the family, whichever is the greater. Exceptions could be made in the case of plantations (tea, coffee, rubber, or sugar cane), orchards, mechanised farms or dairy farms.

6. The East Pakistan Land Revenue Commission, 1959, recommended that the ceiling regarding size of property be raised to 100 acres per family or to 133 acres on less productive lands. It has also recommended the fixing of fair and equitable rents with a maximum of ten percent of the annual gross product.

7. In West Pakistan land taxation is not uniform. In the Punjab and the N. W. F. P., tax, in the rainfed areas, is assessed on a fixed rate per acre of cultivable land, whereas in the canal irrigated areas it is assessed on

the basis of 25 per cent of the net assets.[1] Assessment rates are worked out for each village and individual farmers pay according to the acreage and classification of their land. Water rates are calculated separately.

8. In Sind land revenue and water rates are combined and fluctuate in accordance with the previous year's prices. In parts of Baluchistan where no settlements have taken place there are still other systems.

9. In all areas agricultural income tax is payable on larger estates; this is based on land revenue assessments and is payable at increasingly higher rates as that increases. There are also local land rates, levied to support local government which are calculated as varying percentages of the revenue assessment. At this stage, we make no recommendations on agricultural income tax or on local rates.

10. The Commission has considered the question of land revenue. It feels that the present systems have been designed only with the collection of revenue in view and considers that they should have the additional purpose of encouraging development and increasing production. At present, in parts of West Pakistan, uncropped land pays no tax and there are large areas lying unused. Conversely, if a farmer uses capital and labour to improve a piece of land he is liable to be assessed at a higher rate at the next settlement. Both these conditions militate against development and should therefore be changed. Unused land should be taxed, which would encourage its development and newly developed land should receive tax concessions for a fixed period.

11. The present system of revenue assessment, in West Pakistan, opens the way to malpractices as by declaring a cropped area as vacant or showing a low-tax crop where a high-tax crop is being grown means considerable savings to the farmer. As assessment is done by low-paid Patwaris there is great temptation to record wrongly and share the tax

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1. In each district there is at specified intervals a land settlement whic is a resurvey of the cropping potentialities of the land and the fixing figures for the average yield of each crop. This average yield is con verted into money values in accordance with prices over the past fev years. Net assets are the calculated crop value after the deduction c customary payments and the tax or land revenue is 25% of the net as The term "net assets" in this connection really refers to income ra than assets.

saved. The only safeguard against widespread cheating is periodic inspection by higher authorities.

Changes Necessary

12. The Commission considers that a uniform system should be adopted throughout the country and that landowners everywhere should pay a fixed rate of tax per acre irrespective of whether the land is cropped or not, the rate of tax should be fixed according to present agricultural value of the land; rates should vary by zone and not by individual plots. There should, as already discussed, be tax reductions for some years on new land developed and brought under cultivation. Similarly concessions should be given to undertakings where small farmers combine into cooperative farming units; conduct their farming under a managed system of block farming or some other system which gives the advantages of large scale operations. Such improvements as the installation of tubewells, power pumps, drainage systems should also receive favourable consideration in assessing taxes. In the future when industries have developed and financial resources improved, it may be possible to envisage the reduction of taxes on very small holdings many of which are too small to be profitable.

13. When a new system of land tax is introduced the need to keep elaborate revenue records will disappear along with the opportunities for many malpractices.

14. In considering these matters we would not exclude the need for the imposition of a betterment tax to pay the cost of land improvement by such measures as the provision of irrigation, flood protection or drainage when these are carried out by government. Where public money is used to bring benefits, betterment taxes are an obvious and equitable method of reimbursement.

Export Taxes

15. We have emphasised the overwhelming importance of increasing the production of crops which earn foreign exchange. Export duties on these crops naturally reduce the returns to the farmer and, therefore, the attractiveness and profitability of growing the crops. While we realise

that it is not possible at present to remove all such duties, we would recommend that they be reviewed to ensure that wherever they are acting as a strong disincentive, consideration is given to their reduction to less deterrent levels. In general we are opposed to the imposition of taxes directly on agricultural products and would prefer that where additional revenue is required from agriculture, it be obtained by raising the land revenue tax.

Land Tenure

16. The rights and duties of landlords and tenants and the question of security of tenure are of great importance from a production point of view. There has been considerable discussion in earlier chapters on these matters and on their effect on production. A Land Commission is at work in West Pakistan which has this subject as a principal charge. We recommend that a similar body be set up in East Pakistan although the government there is the only landlord and all the land is held direct from it. These Commissions should examine the present tenancy arrangements and make recommendations which would ensure that both landlord and tenant are in a position to assist in a production drive and that both, particularly the cultivators, are so rewarded that they will put their resources and energy in it. They should examine the security of the tenant from the point of view of the effect on his efficiency and production both long and short term. It may be that too much security for an inefficient tenant is as harmful to production as too little is to an efficient man and, therefore, it may be necessary to provide means for the removal of an inefficient tenant.

17. To enable land-owners to take up direct cultivation of their land particularly those who have lost lands under the land reforms or who wis to invest more capital to increase production, we feel that the present legislation which debars them from securing land from tenants should be re-examined. We recommend the two Land Commissions to do so and th necessary steps taken to safeguard abuses.

18. In East Pakistan consideration should be given to amending the East Bengal State Acquisition and Tenancy Act, 1951, to permit raiyats to acquire rights of ownership and to replace rents by a tax on land. This has already been recommended by the East Pakistan Land Revenue Commission, 1959. We further recommend that the suggested East Pakistan Land Commission should consider how to improve the position of the bargadar and, in order to give him greater security, he should be declared a tenant within the definition of the term as used in West Pakistan.

Litigation

19. There is, in all areas, considerable litigation and disputes about rents, tenancy rights, rights of eviction, etc., which result in a great loss of time and money to farmers. We consider that basic democracies are a suitable organisation for dealing with such disputes or alternatively that arbitration teams could be set up to settle them. In the Philippines the teams of arbitration have had considerable success by visiting the areas and making decisions on the spot. The main object of all or any of these arrangements is to allow the farmer to concentrate all his energies and funds on production.

20. Recent land reform legislation in West Pakistan provides for the tenants of land taken over to become owners of the land. It is yet early to attempt to assess the effects of this change on production. In many cases it may result in increased production because of greater incentives and freedom; in others lack of capital and lack of guidance may result in decreases. There is no doubt that the land reforms are important measures of social advancement but we would advize on the need for ensuring the proper use of undeveloped lands taken over, for assisting landlords to produce more from their reduced estates, for providing assistance and guidance to the ex-tenants now owners, and for cooperative development as envisaged in the Report of the Land Reforms Commission. Good tenants

on land not taken over who have not benefited by the reforms should be given prior consideration for settlement on new colonisation areas.

Problems of Irrigation

21. Irrigation and its problems were discussed at some length in Chapters 4 and 5. The present position in the different areas was set out and the techniques which might be used to bring about improvement were elaborated. Here we wish to summarise our views on what we feel should be done and to make a number of recommendations.

Flooding and Waterlogging

22. To remove flood water from the land, and thus prevent damage to crops and soils, surface drainage must be provided and given top priority. We understand that a programme of work to achieve this has been prepared by the West Pakistan Irrigation Department. While we cannot pass judgement on the technical merits of the prepared programme we do strongly recommend that there be no delay in examining and taking appropriate action on it.

23. Investigations into the best method of draining the soil and lowering the water table have been going on for some time. Tubewells, tile drains and open drains and combinations of these have been tried and it appears that the best method will depend on local conditions. Up to the present the only drainage work undertaken on any large scale is in the Rechna Doab. Evaluation of investigational work should be speeded up so that an extensive programme of drainage works can be started at once.

24. The menace of flooding from the rivers is being considered in West Pakistan by the West Pakistan Flood Commission, which we understand has prepared plans. We have not been able to examine their plans in detail but here would emphasise the great and increasing damage being done by floods. The basic measures needed to control these must be carried out in the river catchment areas many of which are outside Pakistan. Inside the country much could be done in the higher lands by control of cultivation, of grazing and of the felling of forests to reduce the damage

and we suggest that early action on these lines be taken. The need for international action in the catchments outside the country should be kept in view and pursued at every opportunity. In the plains protective measures, such as the afforestation of river banks, the making of protective bunds, the dredging of river courses and the clearing of impeded drainage systems should be undertaken on an increasing scale.

25. In Chapter 5, there were set out in some detail the measures which we considered necessary in East Pakistan to enable large tracts of land, at present subject to flooding, to be used for crop production. These measures include both drainage and protective works and we suggest that an early survey be made with a view to carrying out a comprehensive scheme of such work.

Salinity

26. To control salinity, water must be applied in sufficient quantity to leach the salts out of the surface soil and carry them away in the drainage water or down into the soil. As the supplies of water are limited the problem is where to find additional water which is required for this purpose. There are three possible sources, flood water during the summer months, flood water stored in dams and reservoirs and made available when required, and underground water.

27. Much greater use could be made of flood waters during the summer months. In the past it has been generally considered that as they are available only for a period of around two and a half months, little use could be made of them. We are not in general agreement with this view and feel that by planting such crops as transplanted rice, maize and sorghum, and evolving new crop varieties with a short growing period and by adapting agricultural practices and water management, it would be possible to grow crops during this period. We consider that early steps should be taken to find suitable crops and cropping systems which can make the best use of flood water. It will be necessary at the same time to carry out a detailed study of the cost and practicability of increasing the capacity of the present canal systems or of providing additional systems. It may also be possible

by constructing a new barrage between the present Sukkur and Ghulam Mohammad barrages to bring large additional areas in Sind under cultivation during the flood season.

28. Storage dams are a new conception in the Indus basin but in view of the urgent need for extra irrigation water we feel that the dams planned at Mangla and Tarbela should be of as large a capacity as is practicable and that consideration be given to the building of additional dams in other rivers and streams. Alterations might have to be made in the canal systems to take this extra water from the dams but it is possible that much of it could be used during the winter season by making some of the present non-perennial canals perennial.

29. Underground water can be tapped through wells and tubewells and where the water is sweet these serve the dual purpose of supplying irrigation water and lowering the water tables. In some areas government has already started on large programmes of developing tubewells. We consider that these programmes should be expanded and also that individuals or cooperatives should be encouraged to install wells by provision of credit and boring equipment. The present comprehensive and detailed survey of underground water resources being conducted by the Water and Power Development Authority will supply the necessary data on which expansion can be based.

General

30. We feel that a full study should be made of the water economy of West Pakistan taking into account the changes caused by the Indus Water Agreement. A main object of this study should be to determine the best use of any additional supplies of water. Meantime we would recommend that there should be no new commitments of water beyond the present irrigated areas until such time as these areas are receiving the water allocations necessary for maximum crop production and for keeping the soil in good condition. A study should also be made of the irrigation projects under construction (Gudu, Taunsa and the Ghulam Mohammad Barrage projects) and, in the light of present information, a decision made as to

whether they should be completed in accordance with existing plans or whether alterations should be made to provide for more intensive irrigation on more limited areas. An alternative suggestion that salt-affected or poorer lands be abandoned in favour of better land outside present irrigated areas raises too many social and human problems to be acceptable.

31. In East Pakistan the use of river or underground water for irrigation is as yet not very extensive, but it has enormous potential. In view of the scarcity of land and the pressure of population irrigation schemes should be pushed ahead so that more intensive cropping may be practised.

Agricultural Aspects

32. Irrigation is a means to an end and that end is agricultural production but it would appear that this objective is not always kept to the forefront in planning irrigation schemes. We must again emphasise that to get the maximum production from these very costly enterprises it is necessary to ensure that such aspects as the making of water channels, the levelling of land and the fixing of land use patterns are carefully planned and supervised. We recommend that this be done in all new schemes and that established schemes be examined to see what needs to be done in these matters to bring about higher production.

Charges for Water

33. We consider that the present system of charging for water according to the acreage of individual crops does not encourage the best use of water, that it leads to malpractices and often to hardship to those at the tail of the canals and that it necessitates a cumbersome and costly system of crop recording. We, therefore, recommend that the Irrigation Department be responsible for the delivery of water to the outlets, that water be charged for on a volumetric basis and that each farmer who gets water from an outlet pays in accordance with his commanded acreage. This would necessitate the installations of meters at the outlets to ensure that the correct quantities of water were being delivered.

34. There have been numerous complaints regarding the silting up and choking of canals with resultant water shortages. We recommend that a committee be set up to look into this matter as well as the question of lining of canals. Adequate funds should be made available to carry out efficient maintenance of canals.

35. In an earlier chapter we have made recommendations regarding the responsibilities of the revenue service, the Corporations or the extension service of the Department of Agriculture, and the Irrigation Department in respect of irrigation water and its use.

Colonisation

36. The need for careful and complete planning, down to the individual farm level and for some overall management in colonisation areas, has been elaborated in previous chapters. Here we need only indicate main policy lines.

37. Colonisation areas must be regarded primarily as production projects and not merely as resettlement areas where surplus population from other areas can be set down or where deserving people can be rewarded with grants of land. Emphasis must be on production when allocating the land and choosing the settlers or when laying down conditions regarding the development of the land.

38. Experienced farmers with some capital of their own should be given preference and they should be required to live on the land and to develop it within a fixed period. At the same time government should ensure that assistance is available for such vital production matters as the laying out of water channels and drainage systems, the levelling of the land and the management of the farms.

Use of Labour

39. Scarcity of capital and of foreign exchange are major factors affecting development programmes. Savings and other local sources of capital are expected to be exploited under the Second Five Year Plan, and foreign assistance is being sought to make up the deficiency of foreign

been given to the possibility of the use of surplus labour as a method of capital formation. If all the surplus labour of the country could be mobilised, progress in the large engineering works envisaged here and in the Second Five Year Plan and in connection with the Indus Water Agreement, could be greatly accelerated. Similarly a much larger programme of such works as village road improvement, canals, dams and drainage schemes could be undertaken which would not only result in the provision of capital works but would save foreign exchange so badly needed to purchase heavy equipment. We were informed that labour shortages had held up irrigation works on the G.M. Barrage and drainage works in the Thal but this we consider to be due to the lack of an organisation to mobilise and direct labour.

40. We consider the best method of mobilising labour and using it to the general advantage of the country might be through the creation of a labour corps. In many countries compulsory military service is a national duty and in others service in labour forces or communes is compulsory. We consider that the idea of national service for development should be adopted and provision made by law, so that all men, not gainfully employed and within certain age limits be required to serve for a period of time in a labour corps which would be organised in the form of a semi-military body.

41. Advantage could be taken of the present population census operations to register all able-bodied men between the age of 20 and 45 years. Those who were not gainfully or fully employed, could be called up in groups for labour service.

42. The formation of a disciplined labour corps would have a number of other advantages in addition to the primary one of getting capital works carried out. It would provide employment and additional income for many people on marginal living standards. It would provide an excellent training in a disciplined body for young men and would teach the dignity of labour in work of national importance.

43. Experiments in India should be noted where PL 480 supplies

or funds from the sale of PL 480 supplies have been used to pay labour engaged on development projects. As long as that service is available it may be possible to use it for financing some aspects of this work.

Food Policies

Main Foodgrains

44. We have indicated in chapter 3 of this report that in the food economy of Pakistan foodgrains, especially rice in East Pakistan and wheat in West Pakistan, play a very important part and that the use of protective foods is still limited. Food policies, therefore, generally concern wheat and rice, and we propose here to deal only with the problems relating to these two crops.

Present Wheat Policy

45. Since Independence, the government has been purchasing all the wheat available for sale in the country and distributing it either through a rationing system or through private distribution depots. There was a major change in the food policy last year in so far as it related to wheat.

46. The new policy provided for private enterprise to operate freely in the wheat market while the government continued to maintain sizeable reserves to meet shortages and keep prices within pre-determined limits. The implications of this new policy were examined in great detail in our Interim Report and suggestions were made for its improvement. Most of these recommendations have been accepted and there is no need to repeat them here.

Food Price Stabilisation Board

47. In the Interim Report we also suggested the establishment of a Food Price Stabilisation Board to maintain reserves and keep prices

stable. We consider that with a freer trade in foodgrains, a semi-autonomous and semi-commercial organisation would be in a better position to meet the needs of the situation than a government department. This recommendation has not yet been accepted by the government but in view of the long term objectives of developing private trade in foodgrains on sound lines and of making certain that there is no shortage, we are still of the opinion that the establishment of such a board is desirable and, therefore, repeat our recommendation.

Rice Policies

48. In our Interim Report we have stressed the need for the adoption of a policy for rice similar to that adopted for wheat. Under the present arrangement in East Pakistan the purchase and sale of rice by private trade is not controlled but there is a modified system of rationing. Our recommendation on this matter has not yet been accepted as it has not so far been possible to build up adequate reserves. In view of a good crop last year and imports from abroad, we consider that modified rationing should be withdrawn and replaced by a system of releasing reserves wherever prices tend to rise abnormally and of buying in the local markets when prices fall to too low levels.

Export of Superior Rice from West Pakistan

49. Increases in the output of rice in East Pakistan are likely to be absorbed by an ever growing population and the building up of a reserve. Rice in West Pakistan, except Kangni variety in Sind, is grown as a cash crop and is either exported or sold in urban areas where it is used for preparation of luxury dishes like Pulao. Under present arrangements, surpluses of Kangni are purchased by government and sent to East Pakistan.

50. The superior quality Punjab rice, especially Basmati and Begmi, are now being treated as export crops, and their movement is banned except for export through Karachi. In spite of this policy, the export of the superior rice has not increased much as while about 85,000 tons were exported last year, a much lower quantity is going out this year. Thus,

while the consumption of superior rice within the country has been curtailed the exports have not increased. We recommend a thorough re-examination of the whole policy regarding the marketing of this rice. Until private trade shows more interest, rice may be purchased by government and exports made through private trade, with the association, if necessary, of the Bonus Scheme. The possibility of reducing the present high price to encourage larger export should be seriously considered. A realistic price, which will create a steady foreign market is the best method of increasing exports, and is even better than the Bonus Scheme which inevitably has the effect of creating problems of high prices in the consumer markets within the country. We would also suggest that, as the output of superior rice is likely to increase, consideration be paid to the liberalisation of its movement for internal consumption through normal trade channels.

Food Production Trends

51. These changes in policy become particularly important when production trends are considered. The necessity of leaching requires the planting of high water intensity crops like rice. Rice also responds at a high level to the application of the five firsts and thus large increases in its production are probable. While much of these increased yields, particularly in East Pakistan, will be offset by the increase in population and diversification of cropping, large quantities will be available in West Pakistan for export.

52. It is essential, therefore, to prepare for larger exports of rice in the future and to take steps to establish a reliable export market. In addition to the existing markets for superior rice in East Africa and the Persian Gulf, new markets in Europe and America should be explored both for rice and for rice products such as canned Pulao. Such markets will be found if high standards of quality are maintained and the food laws of the importing countries complied with. It will be desirable to concentrate on the production of Basmati and Begmi varieties not only in the Punjab but also in Sind and to eliminate other superior varieties in order to attain

greater uniformity. In view of the expansion of rice production in the countries of the Far East, it will be more difficult to find an export market for coarse rice.

53. The position regarding wheat is different. An increase in production will be stimulated by the recent policy of permitting prices to rise but this may be offset by the sowing of wheat lands with rice and other crops because of salinity. Moreover, fertilizer use on wheat may not be very extensive until more water is available for winter irrigation. Wheat acreage and wheat yields in the irrigated areas are, therefore, likely to rise slowly. Because of the importance of wheat in the national food economy, it will be necessary to make greater efforts to increase its production in the rain fed areas of West Pakistan where conditions are more favourable and for this reason we have recommended that the West Pakistan Corporation should develop a project there. The West Pakistan Department of Agriculture should also give special attention to wheat in these areas. Plans should also be made for the development of alternative foodgrains such as hybrid maize, hybrid sorghum and barley, which hold out possibilities of large increases.

Cash and Export Crops

Jute

54. A primary need of the country is the earning of foreign exchange and our main foreign exchange earning commodities are agricultural. The principal export commodity is jute and the major portion of foreign exchange comes from this source. Jute is grown almost entirely in East Pakistan and the West Bengal Province of India. Small quantities are also grown in other parts of India, and in China, Brazil, Formosa, Indonesia and a few other countries. Production in those countries though still small is rising. The best jute, however, is grown in East Pakistan. Thus, while Pakistan does not possess a monopoly of jute, it possesses a monopoly of superior quality jute. Soil and water conditions there are ideal for its cultivation, so that Pakistan is likely to retain the advantages of quality.

55. Until recently the government regulated jute production to avoid excessive competition of jute with rice and to relate production to world consumption, which, it was then assumed could not be raised beyond about 110 million bales per year. The acreage which each farmer was allowed to plant to jute was decided annually and any jute planted beyond the fixed area had to be destroyed. As the actual acreage and the licensed acreage generally differed substantially, the system was ineffective and provided another opportunity for malpractices. The present government abolished these regulations in 1959, and supply and demand will regulate the production of jute. As Pakistan produces the best jute and as there is likely to be some increase in world consumption it is hoped that there will be no need to return to the policy of regulating the jute acreage.

56. The marketings of raw jute by the farmer require consideration. His poverty, his failure to combine, and his lack of market information have weighted the balance heavily in favour of the trader. Jute baling presses are usually operated by large traders and export houses, and through these presses they have been able to control prices and the farmer has to accept what is offered. Recent changes brought about by the success of the PIDC in establishing a jute textile industry in East Pakistan have somewhat altered the picture, but not to any great extent. The multitude of trade qualities are complicated and not easily understood by the farmer, the range of prices is very large and not easy to follow, communications are bad and the merchants are astute. As government has set up a Jute Enquiry Commission to look into all aspects of the production and marketing of jute, we shall not address ourselves further to these problems. In view, however, of its great importance as a foreign exchange earner, we urge that an active policy be pursued in carrying out research into the methods of producing and marketing, into finding new markets and new usages for jute both of superior and lower grades. The five firsts applied to the jute crop would result in increased production. The enforcement of grading is a matter of vital importance and should be investigated and

Cotton

57. In 1949, Pakistan was producing 1.6 to 1.9 million bales of cotton of an average of 400 lbs. each. Very little cotton textile manufacturing capacity was available locally then so that almost the entire crop was exported. The cotton textile industry has since grown by leaps and bounds, but the production of raw cotton has remained almost stationary. The effect of increased use of fertilizers has been offset by the recurrence of unfavourable weather conditions and incidence of disease. The domestic consumption of raw cotton has risen to over a million bales thus reducing the exportable surplus to about 700,000 bales per annum. The rise in the domestic production has saved foreign exchange, but the foreign exchange earnings from the export of cotton have fallen heavily. Government wishes to increase the production of raw cotton to 2.5 million bales so that, after allowing for an internal consumption of 1.3 million bales, 1.2 million bales will be available for export. This hope has not yet materialised. The Planning Commission has now planned for the production of 2.25 million bales by 1965. We feel that the intensification of effort as envisaged in this report will enable this figure to be surpassed.

58. Cotton seed is an extremely valuable commodity and forms two-third of the crop. Cotton seed oil and its derivatives are as good a cooking media for many purposes as any other vegetable fat and cotton seed cake is a valuable animal feed. The expansion of cotton production, therefore, is important not only because of the lint but also because of the seed. Luckily cotton responds well to better farming techniques. Many factors have retarded the success of existing programmes for expansion - insufficient water, poor and uneven cover of plants through lack of line sowing, inadequate plant protection, unreliable seed and salinity have all played their part. The steps which we have proposed in previous chapters will help to overcome these difficulties. We suggest that, as a measure of the importance which we place on this crop, the effectiveness of a Union Agent of the Corporation or a Union Assistant of the extension service be judged

production.

59. Efforts must be made to ensure that ginning is carried out in such a way that first quality lint is produced. The position in this respect is not satisfactory; many gins are old and inefficient and ginning is not carefully done. We recommend the formulation of a phased programme for the provision of credit and foreign exchange to enable a gradual replacement of worn and outdated parts of ginning factories to be made and also advocate a programme for the training of operators in ginning factories. The West Pakistan Government has prepared a new Cotton Act to regulate the operations of ginneries. We recommend that this law be put inforce early.

60. The quality of our American cotton is little above that of quality of comparable cotton grown in other countries, because tensile strength is higher and it has other characteristics which place it in a higher class. These qualities should give Pakistan cotton an advantage in the export market but due to lack of publicity on the subject, higher price is not being obtained and we draw attention to the need for increased efforts in this regard. The present trade practice of pegging the price of raw cotton to the price of lint in the Karachi market should be reviewed as it takes no account of the value of cotton seed.[1]

61. A scheme for the grading of cotton has been under examination for some time. We would emphasise the need for early action in this matter.

Tea

62. Tea is an important export crop but recently the internal consumption has considerably increased and so reduced exports. The new demand is being partly met by a higher exploitation of existing plantation, but steps should be taken to expand the industry in all suitable areas,

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[1] Raw cotton prices in the country are generally decided in accordance with formula under which the price of a muand of raw cotton is fixed as a third of the price of lint in the Karachi market, minus the cost of ginning, usually taken as Rs. 3/-. The value of seed is supposed to cover [illegible] and other charges. Thus when price of cotton

especially in Sylhet, Chittagong and Dinajpur in East Pakistan, and Murree, Swat, Hazara and Swat Hills in West Pakistan. As discussed in Chapter 5, there is scope for further planting inside the present tea estates. In the case of new areas, it will be essential to provide credit and facilities for the purchase of land.

Sugar

63. A Sugar Commission submitted its report last year, and we understand that government has already taken decisions on its recommendations. We have, therefore, decided not to make any policy recommendation on the matter.

Oilseeds

64. Experiments in the northern regions of West Pakistan have indicated considerable possibilities for the development of the groundnut crop in improving the agricultural production of those areas. Mustard seed oil is the main cooking medium in East Pakistan and a good deal of the seed grown in West Pakistan is used in East Pakistan. We recommend that efforts be made in East Pakistan to expand its cultivation so that it becomes self-supporting. The production of special oilseeds, such as sesamum and taramira, will, we anticipate, expand in accordance with the extension of their use in animal feeding.

Fruits and Vegetables

65. Pakistan's fruits could compete in the world market if they were properly prepared and graded. Bananas, mangoes and oranges are of a very high quality and the pineapples, litchis, plums and grapes can stand comparison with those of other countries. Good quality papayas, walnuts and almonds are also being grown. These fruits are possible export items both in the raw and in the processed state but cold storage facilities, a government grading service, facilities for raw materials for canning, and foreign exchange and credit need to be made available. Sugar for preserving purposes should be free of excise duties so as to enable the local companies to compete in the outside market.

66. Pakistan is a large producer of coconuts and dates. Much of the coconut is consumed when the nuts are young and green and only a portion of the crop is allowed to ripen. An examination of the possibilities of encouraging people to allow this fruit to ripen should be made so that fibre as well as oil can be produced in quantity. Dates produced locally are not properly preserved. Recently processing machinery was provided for dealing with Mekran dates but the plant has not yet been set up. This should be attended to early and if it is a success other plants might be set up in other date producing areas like Khairpur and Muzaffargarh.

67. Vegetable and fruit marketing has always been in a few hands and the position has not improved recently because of the reluctance of commercial banks to finance trade in perishables. The organisation of producers' cooperatives for vegetable and fruit growers should therefore be given early consideration.

Other Crops

68. Finally, we would like to point out the possibilities of expansion of the production of castor seed oil, now largely used as a lubricant, and of kapok. These commodities are in demand for export. A crop grown in West Pakistan, called gwara has potentialities as an exchange earner, and is also a good green manure and cattle feed; it should also receive attention. The growing of rubber and spices should also be considered.

Animal Husbandry

69. The present condition of the livestock industry and possible methods of improvement have been discussed in previous chapters. Here we wish to set out our views on some matters of policy which we feel merit consideration.

Feeding

70. In many areas particularly those which are intensively cultivated, but also in range areas, it is obvious that animals are under-fed and under-nourished.

71. In the cultivated areas better feeding will probably be achieved only after the application of the five firsts and other measures has greatly

increased the per acre yields of all crops. It will then be possible to diversify the systems of cropping and to use more land for growing animal feeds. With heavier crops, there will also, of course, be larger quantities of crop residues available, many of them valuable livestock feeds. Mixed farming with the better care of animals can thus gradually be extended and perhaps the fattening of lean animals from range areas introduced. Measures for improvement necessary in the range areas are the strict control and management of grazing, the provision of more watering points and the use of a larger part of the irrigation water for the growing of livestock feeds to tide them over times of scarcity. The setting up of an industry for the making of concentrated feeds for stock from by-products, such as molasses from sugar factories and cake from oil factories, should be given encouragement.

72. We consider that a great incentive to increased production of livestock and livestock products could be given by allowing prices to rise to more remunerative levels. Price controls should be avoided so that returns to the farmer are more attractive and he is encouraged to increase his production. This would permit the policy regarding the ban on slaughter of animals on two days in a week to be reconsidered. Since there has been a slight fall in the numbers of cows and bullocks between 1945 and 1955, we advocate the removal of these restrictions as soon as cattle production schemes have been put into operation. There is, we consider, no justification for banning the slaughter of goats and male buffaloes and we suggest that the present restrictions on the slaughter of these animals be removed immediately.

73. In view of the export potentialities of Pakistan's cattle, we feel that the present policy which discourages export of cattle be modified and suggest that special farms set up for the breeding of cattle for export should be permitted to export them freely.

Breeds and Breeding

74. Pakistan has excellent breeds of all livestock, its cattle being outstanding, and could become the source of improved livestock for

tropical countries in the same way as the U.K. has been the source for temperate countries.

Cattle

75. A system of stratification of selected breeds in particular areas is a part of present government policy. While we agree that this is a step in the right direction, there is a need for further experimentation. More emphasis should be put on the development of the Chittagong breeds in East Pakistan and the introduction of the hardy and small-eating Lohani cattle into that province should be considered.

76. Herds of the outstanding breeds should be kept pure and it would be wise to encourage the formation of breed societies with their own herd books to ensure that standards were maintained. This would be of considerable advantage in an export industry as well as locally. There may be some advantages to be gained by the introduction of foreign breeds but meantime we consider that this should be done only on an experimental basis and kept under strict control. The results of introductions made in the past, particularly on the military farms, should be carefully analysed by an expert animal geneticist. Should it be considered that the development of dairy industry would be accelerated by the introduction of foreign breeds, an experimental herd of pure Jerseys, a breed which had adapted itself under similar conditions elsewhere, might be tried. Breeding policies in general will have to be directed in future more to producing milk and beef animals and less to the need for working bullocks, as mechanisation, which we consider inevitable, gradually spreads.

77. In the buffaloes versus cow situation, we are not in favour of keeping two breeds, one for milk and the other for work. It is suggested that corporations should concentrate on selective breeding of cows for milk with a high butter fat content; and for better draught utility.

78. We consider the present artificial insemination schemes to be soundly based and to fill a requirement much in demand, particularly

amongst small farmers, few of whom can afford to keep a stock bull. Facilities available at the insemination centres, including travelling facilities, need to be considerably improved if full advantage is to be taken of the scheme.

Dairy Industry

79. With the hoped expansion of mixed farming there will be a large increase in the supply of milk. We feel that farmers should then be organised into milk cooperatives, their milk collected and taken for treatment to a central plant, and then sold in the large consuming centres. The German system, which makes it obligatory to sell milk to cooperatives operating in a notified area, may provide a suitable model especially in the project areas. This would provide extra income to the farmers and an improved milk supply to the towns. Meantime the setting up of organised and supervised milk colonies on the outskirts of the large cities is a step in the right direction and deserves every support.

Sheep and Goats

80. There are excellent breeds of both sheep and goats in the country. Sheep are being bred for mutton and for wool, both fine wool and carpet wool. Foreign breeds have been introduced to improve the fineness of the wool for cloth making, with, we understand, very good results in the case of the Rombuillets from the U.S.A. We consider that it would be worthwhile employing an expert geneticist to analyse the results of this work and also the work done on selective breeding for both fine and carpet wool.

81. We are not in agreement with the policy of eliminating the goat from all areas, though we agree that free ranging goats are out of place in forest lands and in heavily cultivated lands. In range and hill catchment areas, however, they may be the most economic animal to keep, as they can make the best use of the grazing and browsing there, and there may be considerable loss in eliminating so useful a species of animal.

Poultry

82. We consider that the greatest needs for the development of the poultry industry are the provision of effective disease control measures

and the supply of balanced foods at economic prices. These matters have been discussed in previous chapters. What is now required is action to ensure adequate research, careful production in accordance with fixed standards and the encouragement of private industries by the provision of all the necessary facilities.

83. When these two basic requirements regarding health and feeding have been met, poultry keepers would have much greater security in setting up establishments on a large scale for egg production by intensive methods or for broiler production. We, therefore, recommend that enterprising men should be given all facilities for acquiring the necessary foreign exchange and land and equipment for the building up of such schemes. Arrangements may be necessary in the early stages to allow the importation of eggs or chicks in considerable numbers to supply the foundation stocks.

84. The potential of local breeds for both egg laying and as table birds should be further investigated and developed as should their value for crossing with imported breeds in various areas and under different conditions.

Disease Control

85. We do not consider that the situation in respect of disease control is entirely satisfactory. Apart from the need to strengthen the veterinary service and greatly increase its facilities for carrying out its work, we feel that there is need for the drawing up of an overall plan for the control of all common diseases. Such a plan might be looked upon as a 'crash programme' in animal health and be approved for a period of some years. We consider that powers should be given under law for the veterinary service to undertake compulsory inoculation of animals where this is considered a necessary protection measure.

Marketing

86. In Chapter 4 the present methods of marketing farm produce in the different areas have been briefly described. We consider that in general the systems and methods in operation are inefficient and are a gr[illegible]

handicap to economic development and that there is need for a complete overhaul. What is required is a system which will ensure a fair price to the producer and as low a margin as possible between the producer and the consumer prices.

87. In the Punjab there are regulated markets, supervised by market committees, in which marketing facilities are provided at fixed charges, where standard weights and measures are used, where market information is made generally available and where disputes are settled by the committee. This system which is far superior to anything elsewhere might form a basis for a country-wide introduction of regulated markets. In the Eastern Province the auctioning by government of market rights to the highest bidder should be discontinued as this puts the farmers entirely at the mercy of the lessee as regards charges. The organisation and supervision of markets for farm produce would appear to be a matter in which government should interest itself. There is, nearly everywhere, a great need for the dissemination of information regarding the prices and supplies of the different products. Small illiterate farmers in particular suffer from a lack of this vital information when selling and so may be induced to accept prices much below the value of their produce. The lack of good communications is in many areas a very great hindrance to marketing and anything done to improve this would pay good dividends. We recommend that action be taken on a number of lines.

Information Service

88. There is need for a strong service on market information to be built up which will collect and disseminate information on crop supplies and prices on a province-wise basis. This could best be organised at the Centre by the Directorate of Agricultural Economics with the help of provincial market committees. If the proposal to supply radio sets to all basic democracies is carried out then a quick and easy method of dissemination of information will be available. Basic democracies should also be encouraged to subscribe to newspapers giving market prices and relevant data.

Regulated Markets

89. Markets on the lines of those in the Punjab should be organised everywhere. Basic requirements in such a market are fixed marketing charges, standard weights and measures and a body to settle disputes. We deal with cooperative marketing later in this chapter.

Warehousing

90. Until cooperative or other systems of marketing have been developed there is urgent need for a simple system of warehousing whereby farmers could deposit their surplus crops against a cash advance and so not be at the mercy of buyers through lack of ready cash at harvest time or through lack of storage accommodation. This system could be started in the project areas and its implications have been discussed in Chapter 7.

Cold Storage

91. Provision of cold storage is almost an essential where perishable goods are being produced on a large scale. This applies to crops such as fruit and vegetables as well as to meat, poultry and fish. Facilities could be supplied by private enterprise, which should be given government backing for suitable schemes. When private enterprise is not forthcoming, the Corporations could take direct action in the matter.

Export Trade

92. To assist in the building up of the export trade on sound foundations, consideration should be given to increase the number of Trade and Agricultural Attaches to Embassies abroad to give special attention to the sale of agricultural products. The duties of these Attaches would be to inform the foreign countries of details of produce available in Pakistan and inform Pakistan of possible markets abroad and of the type and quality of produce wanted.

93. Such an export drive would have to be linked with the setting up of standards and of grades which would be acceptable in the world markets. In our Interim Report we recommended that the present Wool Grading Scheme in the Ministry of Food & Agriculture should be separated from

the Cooperation and Marketing Department and a Directorate of Grading and Standardisation introduced which would have the responsibility of fixing standards and setting up grading organisations for exportable commodities. It is appropriate to repeat that recommendation here.

Price Controls and Subsidies

94. The matter of price controls is discussed under the headings 'Food Policies' and 'Cash and Export Crops'. Briefly we repeat here that we agree with government's present general policy of free trade with government regulating the price of the staple foodgrains by releasing stocks from reserve when prices go beyond a certain limit and buying at a fixed price when market prices fall below a certain limit. We agree that there may be need for subsidies to encourage the growing of new crops or crops required for some particular purpose.

Credit

95. A Credit Commission was set up in 1959 to survey the whole field of credit in the country. Its report includes suggestions for the improvement of rural credit. Our proposals differ from these in some important respects and take into account a number of factors which could not be considered when that report was prepared.

Supervised Credit

96. In our view the primary purpose of credit should be to create additional production. A basic defect of the rural credit systems that have so far been organised has been that they have not provided for the supervision of the use of credit given and thus the diversion of credit to unproductive purposes has not been prevented. The main reasons for this lack was the non-realisation of the great importance of supervision and the absence of enough personnel in the field to see that each borrower was really using his loan in the best way for the purpose for which it was granted. A village cooperative could do this but the present thinking of cooperatives is towards the giving of loans up to a particular credit limit without regard to the purpose for which they are to be used.

97. We have elsewhere emphasised the need for supervision of credit

and have recommended that, in project areas, seed, fertilizer, plant protection materials and improved implements should be advanced to farmers on the approval of the project staff. Supervision is particularly necessary in the case of small farmers, and for those living on marginal incomes, as there is great temptation for them to divert the loans to other objectives. For other areas, we have made other recommendations and do not contemplate the provision of supervision there, as staff will not be sufficient.

98. The Agricultural Development Finance Corporation and the Agricultural Bank issue loans for such objectives as the sinking of tubewells, the building of stores, the purchase of farm machinery and bullocks and the planting of orchards. Loans are issued after investigations have been made but there is little evidence that their use is supervised. We believe that there is no alternative to efficient supervision and we suggest that arrangements be made by which credit institutions advance loans in project areas, only on the recommendation of the project staff, and that such loans be supervised by the field staff of the project. We feel that in such areas it will be possible to move towards a supervised loan system of a fairly high intensity.

99. There are circumstances where non-developmental loans are necessary, such as when a farmer falls ill or is involved in litigation. Expenditure for these purposes is necessary and credit should be available. In such circumstances we consider that cooperative societies should play a larger part. In the case of widespread emergencies, taccavi is still the most suitable and perhaps the only workable method of giving assistance.

Issue of Loans

100. Loans required for productive purposes and to be given in kind and used under proper supervision should be easy to get. In the case of five firsts they should be available almost as a matter of routine. Loans made against crops would be much more secure if they were tied in with a marketing organisation and we envisage that in the project areas such organisations will be developed.

101. Large loans are at present only issued against hypothecation of land and we envisage that much of this type of lending will continue to

come from agricultural credit institutions such as the Agricultural Development Finance Corporation and the Agricultural Bank, but we suggest that consideration be given to encouraging commercial banks to enter the agricultural credit field. At present legal difficulties in the way of fore-closure on mortgaged land prevent this and we recommend that these restrictions be examined with a view to their removal in the case of larger farms, say farms exceeding twelve and a half acres in West Pakistan and five in East Pakistan. We are alive to the dangers of farmers incurring unnecessary debts and thereby losing their land, but we consider that a change of attitude is needed and that in a production drive the loss of land by improvident large farmers need not cause too much concern. The danger of commercial banks acquiring large holdings is guarded against by the ceilings on ownership laid down under land reforms and anyhow the advantages of having freely available funds for development outweigh such dangers.

Other Sources of Credit

102. There has been controversy as to whether the cooperative banks should finance private commercial transactions. The advantage of so doing lies in the fact that such transactions can attract large deposits from private business and that these deposits can be used to finance agricultural development. In view of the need for additional resources, we suggest that the banks be allowed to finance outside transactions when these are limited to purchase of agricultural commodities and provided that the deposits which this service attracts are used to finance agricultural development. Such action by the cooperative banks may in some circumstances defeat the objective of the cooperative movement by enabling businessmen to successfully compete against cooperative marketing. Thus a conflict of interest may arise which should be carefully watched and if it appears that the cooperative movement is being hampered then the concession should be withdrawn. One aspect of all credit schemes which needs emphasis is the necessity for making definite arrangements for the recovery of loans and for insisting that loans are repaid; some organisations have in the past been rather lax in this respect.

103. Most of the funds for credit assistance must continue to come from government. No reliable estimates of credit requirements exist, but the Credit Commission suggested the possibility of a need for Rs. 500 million

per annum for short term loans only. Compared to off-take from the agricultural credit institutions, this figure is very large but there is no doubt that as development progresses credit requirements will reach and even surpass these estimates.

104. A substantial increase in agricultural credit will be inflationary if not accompanied by an expansion of production and by savings. Our first object, however, is to achieve a greater output and while a large part of the resulting increase in income may be consumed, a saving campaign could collect some portion of it for further investment. Also by charging a relatively high rate of interest some part of it would be returned and this would enable credit institutions to add to their funds. The intensive nature of work in the project areas would allow greater emphasis to be put on a saving programme.

105. The Commission recommends that a larger proportion of the country's total credit resources be allocated to the servicing of agriculture and that any initial difficulties encountered in using of such funds should not be made an occasion for curtailing resources. The supplies and services involved in the five firsts will be given on what is really a deferred payment basis and as the total credit requirement for these will not exceed the price of one year's supply, we feel that the country can and must afford it.

Rural Cooperation

Cooperative Movement

106. We give below a long extract from a summary of the report of the Royal Commission on Agriculture, which summarises the historical background and describes the position of the cooperative movement in 1934. We have reproduced these extracts as they apply to the position as it obtains now:

"No subject allied to agriculture is more frequently referred to in the course of our Report than cooperation. ... ...

Historically, the cooperative movement may be said to have originated with the recommendations of the Indian Famine Commission of 1901. ... ...

A few societies, which at that time could only be registered under the ordinary company law, had been started in the United Provinces and the Punjab, but the movement only really began to function with the passing of the first Cooperative Societies Act of 1904. The operation of this Act was strictly limited to credit. It was passed, not as the outcome of the popular demand, but was essentially the act of a Government anxious to ameliorate

the condition of the people, and to give it effect, a Government Department had to be established. In 1912, a second Act was passed and is still in force throughout India (except in Bombay and Burma which have their own Acts). This permitted the extension of the movement to non-credit activities. But credit societies still hold the field as is natural where rural indebtedness is so general, and they have this further important advantage that a good credit society has an excellent educative value and is the best foundation for more ambitious schemes. The rural credit society is, in point of fact, the chief corner-stone of the whole movement. ... ...

The main results achieved may be said to be the provision of a large amount of capital at reasonable rate of interest, and the organisation of a system of rural credit which, carefully fostered, may relieve the cultivator from the burden of usury. Success in cooperation cannot, however be gauged by figures and our enquiries have shown that progress has not been uniform in all provinces, and that increase in numbers has not always been accompanied by improvement in quality. The reasons for this would appear to be that, while societies have been registered freely, there has been a lack of patient and persistent education of the members in the principles and meaning of cooperation by teachers competent to perform their task efficiently under adequate supervision. Further there is evidence that supervision and guidance have been withdrawn too soon. Members of cooperative bodies have not been adequately trained to assume the responsibilities thrown upon them; a natural restiveness under control has found expression in resentment against what has appeared to be undue official interference and transactions have been embarked upon which have led to disaster. ....

As the official head of the movement, the personality of the Registrar is a matter of the greatest importance. The post requires such special qualifications that we would recommend that local governments should select the very best man available. Administrative experience and knowledge of the people and their economic conditions and ability to enlist the cooperation of honorary workers are essential qualifications. It is most important that the Registrar should not be constantly changed. ... ..."

107. The causes of the failure of the movement are partly as stated in the extract quoted above. The main causes of failure, however, undoubtedly lie in inadequate preparation before cooperatives are set up in the lack of proper training of the members and the staff, in the failure to develop proper leadership and business management, and in the local jealousies and rivalries. The social changes which followed Independence have added to these difficulties by depriving the movement of a large part of its leadership. These are serious difficulties and special efforts are needed to overcome them. The belief that mere setting up of a cooperative results in betterment is untenable.

108. Agriculture in Pakistan has a number of cooperative features. When new land is reclaimed, when land needs to be manured (and this is usually done by tethering a herd of cattle for 24 or 48 hours in a field), and when harvesting is to be done, a number of farmers join up and work together on each other's fields. In the areas irrigated from surface wells,

the turns for operating the well, arrangements for repairs and the provision of wellgear are mutually agreed upon and altered by agreement. Disputes are settled by arbitration and local rivalries continue to exist without basically affecting matters. In tribal societies, mutual consultation and mutual interests guide decisions. A basis for cooperative action is, therefore, available.

109. It is our ultimate objective to introduce large changes among small farmers through a well managed cooperative movement which would undertake activities ranging from simple credit to marketing and to the reorganisation of farm production. Future cooperative development can best be concentrated on the follow up of the work of the Corporations in the project areas.

110. Outside the project areas, the work will be the responsibility of the Department of Cooperative Societies, which needs reorganisation. To avoid wastage of effort, societies which are not viable should be liquidated. Training of the members and of the staff of the societies, especially in business management, must be provided. Societies of homogeneous groups federated in well managed secondary societies may produce better results than large heterogeneous societies.

111. We attach great importance to the development of cooperative marketing. We have suggested the lines on which this could develop in the the project areas, and would also recommend greater emphasis and larger financial backing be given to it in non-project areas. Societies, however, must be carefully organised by suitable preparatory work and provided with trained business managers. Societies should make an effort to link credit and marketing in order to provide a wider service than pure credit. We envisage that at the final stage these multi-purpose societies, federated into larger units, will be able to pay for the necessary technical assistance to the farmers out of the profits of their undertakings. Societies could also be used to implement government policies for the procurement of foodgrains and other agricultural products.

112. Cooperative work demands men with a sense of mission and an ability to guide. We cannot, therefore, over-emphasise the need for great care in staff recruitment and training.

113. With a greater emphasis on agricultural production, there may be an advantage in separating the agricultural section of the department from the non-agricultural part and in manning the former with men who have agricultural knowledge.

114 We endorse the recommendations of the Royal Commission on Agriculture and the Credit Commission to the effect that the Registrar should be carefully selected, should have a high status, and be not frequently changed.

115. The cooperative movement in this country should expand its contacts with similar organisations in other countries where the movement is a success and the exchange of personnel and the provision of training courses should be arranged. The possibility of international cooperative trade needs to be explored.

Forestry

116. In recent years considerable advances have taken place in the exploitation of the Chittagong Hill and the Sunderban tidal forests. The rate of exploitation and also of regeneration is, however, capable of improvement. In West Pakistan, conservancy measures in the reserved and protected forests are not adequate. We have indicated the condition of the Guzara or village forests and the steps that are needed to regenerate growth in them. A number of irrigated forests have been planted to meet fuel requirements, and recently an attempt has been made to exploit the coastal forests in the Indus delta. Unfortunately very few attempts have been made to make use of uncultivated land for the regeneration of tree growth. The old fuel reserves were exploited at too fast a rate during the last war and regeneration is not keeping pace with the needs.

117. Some years ago the government adopted a forest policy which aimed at covering a proportion of the total area of the country with trees, and to increase the acreage under irrigated forests. The land use pattern of the country is already considerably strained and we think that in areas which can be economically devoted to crop or animal husbandry preference should go to that usage.

118. To ensure forest development without competing unduly with other land use, we recommend that the existing forest policy be amended on the following lines:

(a) Administration of reserve and protected forests in West Pakistan should be improved. In pursuance of that object wherever a forest falls within a project area its control should be transferred to the Corporations.

(b) All village forests should be taken over and so managed as to ensure effective re-afforestation. Legislation will be necessary for this and the question as to whether the land rights should be acquired outright, or only management rights, should be decided in accordance with local conditions.

(c) Special efforts are necessary to develop dry afforestation especially in the dry hills in the west of West Pakistan and in the desert areas, Towards this end attention should be given to local fuel species, and their habits and potentialities studied in fuller detail.

(d) As far as possible, irrigated forests should be discouraged. Instead forests should be planted along the rivers both as fuel and timber reserves and as a flood protection measure. Acquisition of land will be necessary when leasing is not possible.

(e) There should be a strong concentration on afforestation along canal banks and road verges. The responsibility for the maintenance of trees on roadsides should be given to the basic democracies, and the Irrigation Department, with advice from the Forest Department, should be responsible for the growth and exploitation of forests on canal banks.

(f) Shelter belts and wind-break development should be encouraged on the best lines.

(g) Investigation of the possibility of growing special species of trees like Gum in water-logged areas should be taken in hand.

(h) More intensive exploitation of tidal forests should be undertaken.

(i) The present rate of exploitation in Chittagong Hill forests be accelerated and availability of machinery for this purpose increased.

(j) There is scope for the reorganisation and management of grazing in existing forests to encourage sheep and cattle production without damage to forests. This should be investigated and pilot projects set up.

(k) The use of alternative fuels such as kerosene and gas should be encouraged. Further experimentation is needed into methods of producing and using gas from farmyard manures, particularly with a view to reducing capital costs.

Fisheries

119. As has been stated earlier there are very great possibilities for the expansion and improvement of the fishing industry, particularly of marine fisheries. There is also a great need for increased supplies of

fish both to improve the diet of the people in the country and to build up an export trade which could be a very valuable earner of foreign exchange.

120. In order that the industry should develop quickly along well organised lines we consider that a number of measures are necessary.

Marine Fisheries

121. Comprehensive and all the year round surveys should be made of the seas off the costs of both the East and West wings. A fair amount of information is already available regarding potential fishing grounds off West Pakistan but information regarding the Bay of Bengal is very limited. In both cases such information as is available is very promising. Complete surveys would supply data which would enable long term planning to be undertaken for all the facilities needed to build up a balanced industry.

122. Government's present policy of encouraging private enterprise to enter the industry by assisting in the building of boats and the supplying of up-to-date equipment should be continued and expanded. The need for further fishing harbours and fish markets, on the lines of those constructed at Karachi should be investigated and action taken where necessary. Cold storage and refrigerated transport will be necessary and may require both direct action by government and the encouragement of private enterprise. Similarly processing plants to prepare fish, either for the internal market or for export, will be necessary and here again private enterprise should be assisted and encouraged.

123. Cooperative societies of fishermen have been formed at Karachi and Chittagong but this activity needs to greatly expanded.

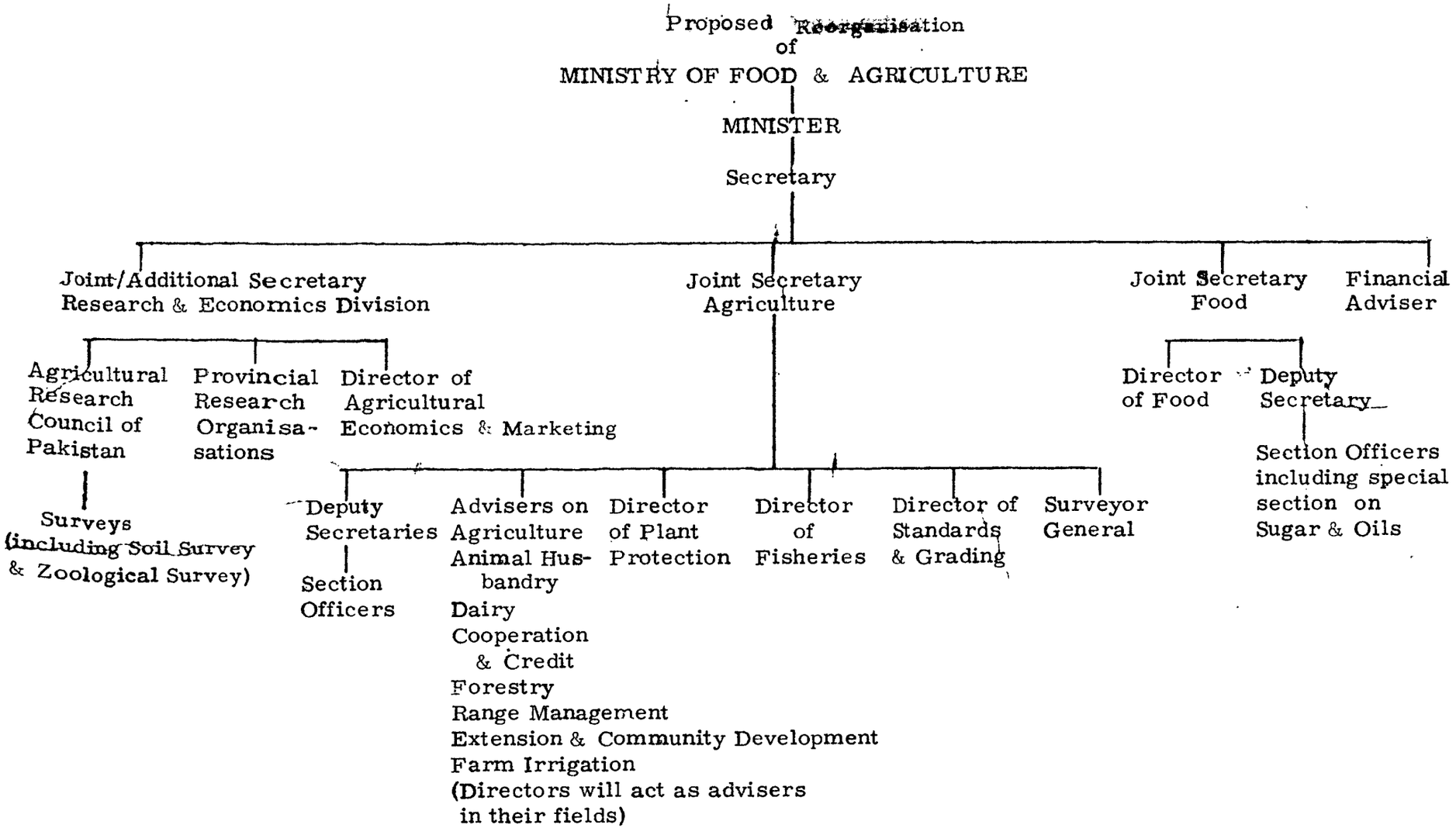
Inland Fisheries

124. Complete surveys of the present position and of potentialities would provide a reliable basis for development plans. In West Pakistan particularly the information now available has been rendered out-of-date by the building of barrages and dams and the diversion of water into canals. A first requirement for development and improvement will be the enforcement of the laws and the rules and regulations which have been

framed to prevent the over-exploitation of the rivers and other waters, this we understand is not at present being done. The present system of auctioning fishing rights should be examined with a view to determining its effects, particularly long term effect on development and improvement of inland fisheries. In this connection we consider that the Fisheries Departments should be given the responsibility for the letting of fishing rights so that the policies of letting and development may be better co-ordinated.

Fish Farming

125. In East Pakistan fish farming is an industry of considerable magnitude and in West Pakistan it is of growing importance. Unfortunately, many of the ponds and tanks in East Pakistan have been allowed to become choked by weeds or silted up. A programme of work to rehabilitate them is being undertaken by the Fisheries Department. This should be intensified and speeded up. Good work is being done in investigating the best methods of stocking and managing ponds and new species of fish are being introduced and tested. We consider that there is justification for a considerable expansion of fish hatcheries either by government or by private enterprise so that all pond owners are able to obtain regular supplies of young fry of the recommended species with which to stock their waters.


Proposed Reorganisation
of
MINISTRY OF FOOD & AGRICULTURE
MINISTER
Secretary
Joint/Additional Secretary
Research & Economics Division
Joint Secretary
Agriculture
Joint Secretary
Food
Financial
Adviser
Agricultural
Research
Council of
Pakistan
Provincial
Research
Organisa-
sations
Director of
Agricultural
Economics & Marketing
Director
of Food
Deputy
Secretary
Surveys
(including Soil Survey
& Zoological Survey)
Deputy
Secretaries
Section
Officers
Advisers on
Agriculture
Animal Hus-
bandry
Dairy
Cooperation
& Credit
Forestry
Range Management
Extension & Community Development
Farm Irrigation
(Directors will act as advisers
in their fields)
Director
of Plant
Protection
Director
of
Fisheries
Director of
Standards
& Grading
Surveyor
General
Section Officers
including special
section on
Sugar & Oils

CHAPTER 11

MISCELLANEOUS

Re-organisation of Agricultural Administration

1 One of the terms of reference of the Commission was to suggest necessary measures for strengthening the organisation and personnel charged with responsibility for agricultural development at the Centre and the Provinces. Government also wanted the views of the Commission on the report of the Re-organisation Committee in so far as it related to the Ministry of Food and Agriculture. In the Interim Report of the Commission, it was pointed out that the question of re-organisation of the Ministry could only be considered after a decision had been taken by the Constitution Commission on the relations between the Centre and the Provinces. However, one of the basic problems to which the Commission had to find an answer was that of an integrated agricultural organisation. Keeping that objective in view, we have suggested the setting up of Agricultural Development Corporations in the two Wings of the country (Chapter 7) and have suggested measures for strengthening the existing Agricultural Departments in areas outside the scope of the Corporations (Chapter 8). If our recommendations are accepted, they would affect the set up of the Government at all levels including the Centre. We, therefore, suggest that the question of re-organising agricultural administration may be examined after a decision has been reached on the Commission's recommendations. As a general principle, and in accordance with our recommendation in the Interim Report, we consider that the Centre should, in consultation with the Provinces, deal with the national aspects of policy, planning, financing and evaluation of agricultural programmes and the implementation should be left primarily to the Provinces. The Centre will also have to handle international contracts and foreign aid. On this basis, we make the following recommendations, mainly on the lines already suggested in the Interim Report, for re-organisation at the Centre and the Provinces.

The Ministry of Food & Agriculture at the Centre should have the following Divisions:-

(i) A Food Division unless the Food Price Stabilization Board is established.

(ii) A Division for Agricultural Administration (including a Section for implementation of the Commission's recommendations).

(iii) A Division for Research and Agricultural Economics, as already recommended.

2. We are unable to say whether the number of Section Officers and Deputy Secretaries in the Ministry is too large or is inadequate. The number of such officers needed in the Ministry would depend upon the work load from time to time and the position will have to be reviewed periodically by the Secretary of the Ministry.

3. The staff in the Directorate of Foodgrains and Storage should not be reduced and may need expansion. Much larger imports are being made under the new food policy and a careful watch will have to be kept on the market. The duties of watching over the foodgrain trade are permanent and the nation has to be protected against the risk of food crisis by intelligent anticipation and efficient management of reserves and distribution. If, however, the Commission's proposals for the setting up of a Food Price Stabilization Board are accepted, the Directorate of Foodgrains and Storage will become superfluous and a very limited staff will be retained in the Food Division.

4. The Directorate of Sugar may be abolished but sufficient staff should be added to the Food Division to handle the problems of sugar price fixation, sugar allocation and general control on the manufacture of edible oils.

5. We understand that the Directorate of Defence Purchase has already been transferred to the Ministry of Defence. We recommend that the Directorate should not operate directly in the market for the procurement of wheat, rice and sugar and should continue to get supply of these commodities from the Food Division.

6. An Attached Department of Experts and Advisers as proposed by the Administrative Re-organization Committee will not improve matters as it will merely act as a bottleneck. The following Advisers are considered necessary to advise the Minister and Secretary:-

(i) An Agricultural Adviser assisted by experts at a lower level for soils, fertilizers, agronomy, horticulture, machinery etc.

(ii) A Director of Agricultural Economics who would advise on economic matters and handle statistics, crop studies, marketing and market information,

(iii) An Animal Health Adviser assisted by an Adviser on dairy farms and animal husbandry problems,

(iv) A Cooperation and Credit Adviser,

(v) A Forestry Adviser

(vi) A Range Management Adviser,

(vii) An Adviser on Extension and Community Development,

(viii) An Adviser on Farm Irrigation,

(ix) The Director of Fisheries will continue to act as Fisheries Adviser and the Directorate of Fisheries will be kept at its present level,

(x) The Directorate of Plant Protection will continue to act as Adviser on Plant Protection. The field work of the Directorate should be transferred to the Provinces and the Centre should handle only locust control, international coordination programmes and international quarantine. Import of machinery and pesticides will continue to be handled by the Ministry until the Corporations take over.

(xi) A small Agricultural Census Organisation should continue to exist even after the present Census is over, to undertake periodical censuses during the inter-censal years.

7. The Survey of Pakistan should continue to be a part of the Ministry and need not be transferred to the Ministry of Defence.

8. The Wool Grading Organization should become an independent will be responsible for administering and developing schemes for standardization and grading other commodities as well.

9. The Pakistan Animal Husbandry Research Institute at Peshawar

and Comilla should be transferred to the Provinces. Similarly the Forest College and Research Institute at Peshawar and Forest Research Laboratory at Chittagong should be transferred to the Provinces. The Zoological Survey Organization should be transferred to the Council and any future botanical, ecological and other possible surveys should also be its responsibility.

11. We have made recommendations about the extension service of the Department of Agriculture upto the Divisional level in Chapter 7 and about the research section in Chapter 9.

12. We feel that there will be an advantage in providing coordination at the Provincial level between various departments dealing with agriculture and we suggest that a senior officer should provide coordination between the Departments of Agriculture, Animal Husbandry, Cooperative Societies, Forests and Fisheries

Agricultural Statistics

13. The absence of basic statistical intelligence has been a major handicap in the task of making an accurate assessment of the socio-economic conditions prevailing in the agricultural sector of the country. Statistics produced at present are not properly set out or coordinated and are neither adequate nor entirely reliable. The most complete records are those from the old Punjab, NWFP and Bahawalpur regions of West Pakistan. The basic information comes from the records of the Village Accountant, or 'Patwari'. He maintains a record of rights, registers changes of ownership and keeps complete records regarding the owner, the tenant and the acreage and output of crops and the method of irrigation. The type of records kept are periodically revised in accordance with the established convention and instructions. On the basis of these records, the Ministry of Food and Agriculture annually issues estimates of the area and production of major crops. Area figures compiled from these records are less inaccurate than the production figures. The best that can be said about the production figures is that because of the

consistency of error, it is possible to establish a trend which gives a rough idea of the long term production movement. It is generally believed that production figures are underestimated.

14. In other areas of West Pakistan, the system of record keeping is less developed. In Sind records are maintained by the village accountant, or Tapedar, but these records are even less accurate than those of the Punjab. In East Pakistan the data are mostly based on rough estimates made at the time of sowing and harvesting of crops. Records of ownership are not maintained but an officer, the Registrar, deals with all cases of transfer of land. The areas of Baluchistan and the Tribal Territory in West Pakistan, and the Hill Tracts of Chittagong in East Pakistan, are called 'non-reporting' and no machinery for compilation of any statistical data exists there. Only very rough estimates of ownership and of cropping and production are available for them.

15. We have recommended the use of the Central Statistical Office and other Statistical Agencies of the Central and Provincial Governments to collect information, The dissemination of information will have to be organized by the Research and Economics Division of the Ministry of Food and Agriculture with the aid of these organisations. Advantage may be taken of the statistical knowledge of the Central Statistical Office in establishing standards and preparing a manual of instructions. Our suggestions regarding the improvement of the condition of services in agriculture should apply to statisticians also.

16 With the change in the system of land taxation proposed in the previous pages, the harvest inspection by the Patwari will lose much of its importance, and the existing uncertainty of production estimates will be accentuated. It would, therefore, be desirable that crop cutting experiments, on a sample basis, should be introduced as a regular feature and their scope and coverage extended to as many crops as possible.

17. At present crop estimates are issued so late that they lose their utility. It would be desirable that serious efforts are made to remove

bottlenecks so that estimates are available earlier.

18 According to the present practice acreage and production estimates of only a few major crops are being issued. A number of crops which were unimportant a decade ago are now sufficiently important to merit the same consideration as is given to the other major crops The production of fruits, for example, is increasing steadily and there will be a definite advantage in issuing acreage and output figures of orchards at least once a year The Ministry of Food and Agriculture should, therefore, revise and bring up-to-date the list of crops for which annual estimates are prepared This might be done in consultation with the Central Statistical Office and the Provincial Statistical Bureaus.

19 We have recommended elsewhere that the Agricultural Research Council of Pakistan should carry out a series of surveys and studies on agricultural subjects, and that the agency of the Central Statistical Office and especially its Sample Survey Unit, as well as the Boards of Economic Enquiry should be used for this purpose.

20 For the first time in the history of this country an agricultural census has been held. It has attempted to collect a great deal of basic data which will fill many of the gaps in existing records. The Commissio considers that a census of this kind should be held every 10 years in accordance with the international programme of the Food and Agriculture Organization of the United Nations, and should continue to include all aspects of livestock and crop production. As has been suggested it will be desirable that a part of the Agricultural Census Organisation should continue to exist after the operations of the present census are over, in order to prepare periodical estimates to ensure regular flow of basic statistical information during the inter-censal years.

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1. The crops for which estimates are issued are crops f nich rice, wheat, jowar, bajra, maize, barley, gram, rape and mustard, sesamum, sugar cane, tobacco, tea production and jute.

Production Targets

22. One of our terms of reference is that we should suggest production goals for food grains and major non-food crops. As will be evident from the previous chapters, our aim is to achieve an all round improvement in the agricultural sector of the national economy by recommending measures which would assist and urge the farmer to make the maximum use of land and other agricultural resources. As such we consider it unnecessary to set up specific targets for various crops, and we have, therefore, made no recommendations on this subject. Targets are needed if emphasis is to be placed on any special crop. We think, fixing of targets at this stage will be rather arbitrary and not serve the purpose the Government has in view. It would, however, be desirable to evaluate the likely results of our recommendations, but as we do not know which of our recommendations will be accepted, we have not attempted this evaluation. If all our recommendations are accepted, we feel certain that by 1965 the total increase in production would be much higher than the targets set in the Second Five Year Plan. Extension of the use of 'five firsts' alone would, in our view, raise production beyond that anticipated in the Plan. As it is not possible for us to anticipate exactly when the two proposed Corporations will be able to make their full impact on production, it is difficult to assess the results of their efforts by 1965. All we can say now is that the results will be very substantial.

Price Incentives

23. We were also asked to suggest measures considered necessary to provide cultivators with greater incentives in particular, in respect of taxation, pricing and procurement policies, subsidies, credit and marketing. While we have already dealt with most of these subjects something, perhaps, should be said regarding price incentives. We have discussed the pricing policies with regard to wheat and rice, and in the case of wheat we have supported the present methods of controlling prices, and in the case of rice we have made recommendations. We have also recommended that

the prices of meat and milk should be allowed to rise so that production is profitable. In our views a free play of economic factors is the best guarantee of a fair price for the producers, provided marketing handicaps are removed. We are, therefore, not making any recommendations on price supports and price incentives and think government policy should work towards the establishment of a market economy.

Animal Breeding

24. A working party to examine animal breeding problems was set up by the Ministry of Food and Agriculture, and it was asked to submit its report through this Commission. We have discussed most of the problems as contained in this report and have made suggestions in the previous chapters dealing with these subjects.

Selectivity of Production

25. The President of Pakistan expressed the hope that the Commission would be able to make some suggestions on selective cultivation or zonal cropping. We have emphasised the need for development of mixed farming and of some special crops in the project areas as well as throughout the country. Selection of particular crops to be grown, in partial exclusion of others, in particular areas, will require considerable research if such a selective cultivation is to give more economic returns than what is obtainable now in the present rotational system, and we have recommended that future research should be organised to achieve that end. We think it desirable at this stage that the best use be made of present knowledge in developing the rotational and mixed farming patterns suitable to local conditions. Once this has been attained the principle of selective cultivation will follow from this line of action and can easily be established.

CHAPTER 12

FINANCIAL IMPLICATIONS

Introduction

Before concluding it seems desirable to attempt to estimate the financial implications of the proposals made in this report. We have not attempted to evaluate the benefits which will result from the adoption of our recommendations as there are, at this stage, too many imponderable factors but we have no doubt that they will be very great indeed.

2. The financial estimates given below have been calculated for the period of the Second Five Year Plan. They are set out separately for the two proposed Corporations, the proposed research organisations and the reorganised departments. Our proposals on irrigation are of considerable magnitude and will involve large expenditure but before a detailed estimate of the costs can be made a lot of preparatory work will have to be done and thus it is not possible to include such estimates here. We hope that each such proposal will receive consideration in accordance with the emphasis that we have placed on it.

Corporations

3. We have recommended that the Corporations be financed by the Centre, and that the savings in the provincial budgets which would follow, be used to expand the activities of provincial departments and to improve salary scales.

4. In preparing estimates we have calculated the requirements of staff generally in accordance with the proposals given in Chapter 7. We have followed the procedure adopted in the Plan and have not included the requirements of capital for the purchase of materials when this cost is to be recovered from the farmer, but have taken into consideration only the amount required as subsidy. The capital required for the purchase of supplies should be loaned by the government and be repaid after a year. Where requirements during the Plan period are not much above those already provided, we have made no new provisions. The expenditure

of the Corporations other than that discussed above has been considered as new expenditure. Estimates of expenditure have been made for four years of Plan as there will be very little expenditure in the current year.

5. The headquarters staff of the two Corporations when fully functioning, will require an estimated sum of Rs. 25.60 million.

6. The estimated expenditure on the Supply Wing administration would amount to Rs. 84.33 million for West Pakistan and Rs. 77.63 million for East Pakistan. Much construction work will be necessary on depots and stores, and this will require an estimated expenditure of Rs. 85 million in West Pakistan and Rs. 98 million in East Pakistan. The Plan provides Rs. 10 million for building of depots in East Pakistan, but in addition to this the current budgets of both the provinces include Rs. 13.10 million for East Pakistan and Rs. 8.50 million for West Pakistan for the construction of depots at union and higher levels. Deducting, therefore, Rs. 31.60 million, the additional moneys required for buildings would, thus, be Rs. 151.40 million.

7. In addition, the Supply Wing will require funds for the purchase of seeds, implements, fertilizers and plant protection materials. The Plan already provides for this type of expenditure, but our proposals envisage greatly increased usage in some directions. We calculate that an additional sum of about Rs. 15 million will be required to meet subsidies and other costs of fertilizers. Expenditure on the purchase of seeds and on the seed and cattle farms will probably not exceed the provision made in the Plan.

8. The Plan proposed an expenditure of Rs. 256 million on plant protection measures. Our proposals involve much more intensive work and we estimate that costs will increase by 25 per cent or Rs. 64 million. We consider that the provision in the Plan of Rs. 6 million for the purchase of implements will not meet all the needs and that it should be stepped up to at

least Rs. 10 million.

9. It is not possible now to estimate accurately the credit requirements as they will grow as development progresses, but the present Plan provision of Rs. 200 million will certainly have to be augmented considerabl

10. The total additional expenditure on the Supply Wing, excluding credit, will amount to Rs. 396.36 million.

11. We estimate the requirements of the Field Wing on staff and equipment at Rs. 47.76 million for West Pakistan and Rs. 24.39 million for East Pakistan. Included in these estimates is expenditure on research liaison staff as well as on additional help to the Union Agent. Calculations have been based on an estimate of the annual expenditure of an average sized project and includes the provision of transport.

12. Thus the total additional expenditure of the two Corporations during the four years of the Plan will amount to Rs. 494.05 million.

Reorganisation of Research

13. We have suggested that a sum of between Rs. 10 and 20 million should be provided annually for research in agriculture and allied fields. In the first year, the total requirement may not exceed Rs. 10 million but it is expected that expenditure will reach the figure of Rs. 20 million in the final year of the Plan. The total sum required during the Plan period will, therefore, be less than Rs. 70 million. As we have already suggested that the savings in the provincial budgets on research be used for the expansion of education and training, this expenditure will be new expenditure. Capital requirements for research institutes cannot be calculated at this stage.

Reorganisation of Departments

14. We have indicated that the expansion of the Departments of Agriculture, as proposed in Chapter 8, is possible within the limits of the funds already envisaged in the Plan. The additional funds needed for the higher salaries proposed will be offset by the reduction of the field of work of the departments, through the transfer of the supply administration and of

the project areas to the Corporations. In the case of the Animal Husbandry Departments it will not be possible to reach the goal of one hospital or dispensary at each union within the Plan period as the required number of veterinarians will not be available. The Plan has provided for the establishment of 100 new hospitals, the modernisation of existing 250 dispensaries, and for mobile units. It is considered that this provision will be sufficient. The total funds required by these departments will, therefore, not exceed the Plan allocations. The Cooperative Department will require more funds but it is not possible to estimate its requirements until a complete overhaul of societies has been carried out. The Plan already provides for additional funds for this department, and it is possible that the expansion may be met from there

Conclusion

We are conscious of many shortcomings in this report. In commissions of this type, it is usual to plead lack of time, for the commissions' inability to handle many intricacies of the subject. We have done the same in many cases. The subject within the purview of the Food and Agriculture Commission, however, was the largest that had been given to any commission, the data available were meagre and the enquiries to be made especially at the lowest level large and elaborate. We were able to probe certain matters while in case of others we could only gather general impressions. We would repeat that our scrutiny and discussions revealed at an early stage that much of the knowledge needed for making improvements in agriculture and increasing production was available in the country, that a number of commissions had already examined the techniques which could bring this about, and that the real weakness lay in the country's inability to implement the proposals already known. We had, therefore, to find a suitable instrument for implementation and, throughout our enquiries we gave this matter the first importance. Our proposals regarding the establishment of two Corporations were elaborated after anxious thought. We realise that it is impossible to lay down hard and fast rules on a subject which has such a large variety of conditions in which application of methods must differ from place to place and from subject to subject. We have, however, suggested the broad lines of work to serve as a guide for the operations of the Corporations.

2. We make no apologies for repeating the principles on which we have based our recommendations. We feel that no department of government, nor the government as a whole, is in a position to increase agricultural production without obtaining the cooperation of the farmer and that production can only be increased by the farmer in the field exactly as industrial production can increase only through the efficiency of labour and management in a factory. Labour and management, however, can only be effective to the extent of the facilities that are available to them. We fee

that there is lack of realisation of the fact that each individual farm stands in the same position as a factory. Production can be increased by individual farmers and workers in the field provided a suitable psychological atmosphere can be created under which they will be willing to do so; and provided all the needed facilities are available. We have pointed out that investment of capital in agriculture is woefully small, and that large sums of money need to be pumped in if the farmer is to be enabled to achieve higher production. A few farmers are in a position to invest capital, some more are in a position to borrow money for investment but a large proportion has to be provided with credit. These circumstances place a far higher importance than has been yet done on the need for provision of credit and supplies as near the farmer as possible.

3. We have no doubt that the present yields in Pakistan can be substantially increased. A large increase can come from the application of the "five firsts". Research can discover methods, as it has done in other countries, the use of which can produce much higher yields. If, in addition, all farms are developed on business and scientific lines, the increase envisaged can be further stepped up, and a stage can be reached where expanding population, for some time to come, will not be the menace it now seems. In Japan, and in several other countries, incomes from small farms are large enough to bring returns which seem almost miraculous in relation to our yields, and we aim at reaching that level.

4. We have made a number of recommendations which are ancillary to the main organisational recommendations. We consider these as part of an integrated effort to free the farmer from a number of environmental restrictions and enable him to move towards a market economy. Some controls are envisaged in the programme, but they are designed to assist development. Our taxation proposals have been made with the same aim.

5. The pace of agricultural development is necessarily slow but we have no doubt that if the measures we have suggested at various levels are

diligently pursued some improvement will be made within the next two years and larger returns will be possible at the end of the Plan period. The real advances will, however, take a longer time. The changes we envisage in the farming patterns and in the overall agricultural economy cannot be brought about overnight. The sense of urgency that compels the present attention to agriculture is welcome but lest this be succeeded by a sense of frustration, we must utter a note of caution and remind the government and the people that the achievement of real results will only be possible after some years of effort. It is important that continuous evaluation be undertaken to establish that we are proceeding on the right lines and it is equally important that the programme once adopted be diligently pursued.

6. Our principal aims are to increase agricultural production, to increase the incomes of the farmer and to improve the country's viability by increasing its foreign exchange earnings. We have not emphasised self-sufficiency in food as on the present patterns of agricultural economy of this country, any upsurge in agricultural production would lead to self-sufficiency. The margin between deficit and surplus in food on the present population levels is comparatively small. The gap will become wider as the number of mouths to feed increases and, therefore, efforts for increasing production must continue through the years.

7. Finally, we feel that an organisation can bring results only to the extent of the devotion, the energy and ability of its staff. The persuation of the farmer, the winning of his confidence and the introduction of changes are matters of great difficulty. They can only be achieved by men who have something to give, who have a sense of a mission and who are administratively efficient. We have faith in the ability and development-mindedness of the people of Pakistan. We have every hope that a national effort of the

magnitude we envisage will succeed. It is in that hope that we commend our recommendations for acceptance.

Malik Amir Muhammad Khan,
Governor, West Pakistan
(CHAIRMAN)

Mr. G.S. Kehar, S.Q.A.,
Member

Mr. S. Inair Hussain Shah,
Member

Mr. S.G. Kabir,
Member

Mr. S.I. Haque,
Member

Dr. M.O. Ghani, S.Q.A.
Member

Dr. A.G. Black,
Member

Mr. A. Gaitskell,
Member

Mr. M.A. Cheema,
Member/Secretary-General

GLOSSARY OF VERNACULAR TERMS.

Abadis	Inhabited areas
Aman	Rice crop sown in summer in East Pakistan
Aus	Rice crop sown in spring in East Pakistan
Basmati	A superior variety of rice in West Pakistan
Barani	Rain fed
Bargadar	Share-cropper in East Pakistan
Batai	Share cropping
Begmi	A variety of rice in West Pakistan
Berseem	Egyptian clover (Trifolium alexandrinum)
Boro	Rice crop sown in winter in East Pakistan
Bund	Dams and dykes
Desi	Indigenous
Dirk	Australian variety of wheat
Ghee	Clarified butter
Gur	Jaggery
Guara	Cluster bean (Gyamopsis psoralioides)
Guzara forest	Village forest in the Murree and neighbouring hills which are managed by villagers themselves
Hats	Local markets in East Pakistan
Haor	Low lying areas of East Pakistan which are completely under water in the rainy season
Hukka	A Pakistani smoking pipe
Jhuming	Cultivation of hill slopes after burning of bushes and trees
Kacha road	Unmetalled road
Kachi area	Area in Jacobabad District
Kanungo	An officer supervising the work of Patwaris (village accountant)
Kalar	Alkaline soil
Kharaba area	Areas where crops have been damaged
Kharif	Crops sown in late spring in the beginning of summer and harvested in autumn in West Pakistan

Litchi	A fruit crop locally grown in East Pakistan
Maund	82.29 pounds
Mung	Pulse crop locally grown (Phaseolus aureus)
Mukaddam	Field Assistant in Agriculture Department
Multani	Pertaining to Multan District
Nahri	Canal irrigated
Naib Tehsildar	The deputy/assistant of Tehsildar
Nullahs	Small streams
Patwari	Village registrar and accountant
Pat area	Area in Sibi District
Parmal	A superior variety of rice in West Pakistan
Powindah	A group of Afghan tribes who migrate to Pakistan during winter
Pohli	Name of a weed (Carthamus oxyacantha)
Pulao	A Pakistani dish prepared from rice and mutton
Punjabi	Pertaining to the Punjab area in northen part of West Pakistan
Rabi	Crops sown in autumn and harvested in the following spring in West Pakistan
Raiyat	Tenant in East Pakistan with rights on land
Ranikhet	Name of a poultry disease
Sailaba	Irrigation through flooding
Sarson	Indian colza (Brassica campestris)
Taramira	Rochet (Eruca sativa)
Taccavi	State agricultural loan
Tappedar	Village accountant in Sind
Tehsil	Sub-division of a district
Tehsildar	Revenue Officer-in-Charge of Tehsil
Thana	Police station
Zaid Rabi	Crop sown in late spring
Zamindars	Landowners
Union	Smallest unit of administration comprising of 2 to 5 villages
Warabandi	Regulated water turns
Ziledar	Supervisor of irrigation patwaris (village accountant)

LIST OF ABBREVIATIONS

ADFC	Agricultural Development Finance Corporation
CENTO	Central Treaty Organisation
CSO	Central Statistical Office
CUSEC	Cubic Feet of Water per Second
FAO	Food and Agriculture Organisation of the United Nations
FACP	Food and Agriculture Council of Pakistan
G.M. Barrage	Ghulam Mohammed Barrage
ICA	International Cooperation Administration
NDO	National Development Organisation
NWFP	North-West Frontier Province
PIDC	Pakistan Industrial Development Corporation
PL 480	United States Public Law 480
U.K.	United Kingdom
U.S.A.	United States of America
V-AID	Village Agricultural and Industrial Development Programme
WAPDA	Water and Power Development Authority
World Bank	International Bank for Reconstruction and Development

Mr. S.G. Kabir's note was received too late to be incorporated in the copy of the Report presented to the President. It is now being attached to all other copies.

(M. A. Cheema)
Secretary-General

Section I -- Chapter 3

The National Need for Increased Agricultural Production is dealt with here. The nation's need for Food for human consumption, for Raw Materials for domestic consumption and for export and for Fodder for cattle is emphasised with an impressive array of statistics. To these broad and general categories of agricultural production must be added Fuel or Firewood as a substitute for cowdung and straw which are now burnt.

A careful allocation of land, our scarce productive resource is indicated here. No guidance is however, offered as to how this allocation of our scarce productive resource between the various competitive uses is to be attained in a free enterprise economy, which cannot possibly contemplate the compulsory physical allocation of land to the various categories of agricultural production enumerated in general terms.

Farmers who are men of small means or poor by and large must be, from the very nature of the case, the sole agents for the implementation of the planned agricultural development programme. The target of increased agricultural production envisaged at the national level, which is but a generalized statement of the national need, has to be projected into the production goal on individual farms and in the villages. The nation is interested in the Aggregate Agricultural Production, while the farmer is more concerned in the Profit to be obtained therefrom. Here is a clear indication for a firm and sound price policy, which does not appear to have received adequate treatment at all commensurate with its importance as a factor calculated to operate as an incentive and mobilise productive resources-

land, labour and capital towards the attainment of the national production goal.

The stabilization of agricultural prices and income is the logical conclusion of a policy which aims at the production of different crops at various levels without compulsory allocation of land and other productive resources between the competing crops. This must not be misconstrued as a rigid integration of an inflexible price structure. All that is needed here is the maintenance of parity in the prices of agricultural commodities.

In furtherance of the price stabilization policy it may be necessary to adopt also the price support scheme in favour of the crop the production of which is liable to deviate from the target fixed on account of changes in relative prices. Such a scheme in favour of the crop the production of which deserves to be encouraged from the point of view of national need but turns out to be unremunerative is a convenient and handy instrument therewith to reconcile the national need with the private interest of the farmer, who is none too well-to-do or solvent. This is all the more necessary in view of the patent fact, as pointed out in this very chapter, that the average agricultural income is far below the national average.

It is apprehended that the producers will eat more as they earn more and that they will keep more for their own consumption. The conclusion which has been drawn from this premise is that the current flow of the marketable surplus will be blocked and that the prices of food grains will thus be pushed up to the detriment of the urban and industrial consumers. It is further apprehended that with a rise in the foodgrain prices a

smaller margin of the current production will be released for sale in the market and that the upward spiral movement of prices, which occurs at the initial stage, will be accentuated more and more as the farmer's cash need is satisfied with the sale of the smaller margin of the annual production.

The apprehension entertained on this dual count is, to my mind, unfounded. There is no reason for the large and medium producers to retain a larger proportion of their crop than now, even if they do not reduce it, since their own produce as at present more than suffices to meet their own consumption need. Even if they maintain the present proportion between consumption and sale, it would mean an increase in the supply in the market because of an increase in the size of the crop to which the marketable quota would bear the identical proportion. As for the small and uneconomic farmers, they, too, often sell a proportion of their crop soon after the harvest for the payment of rent, repayment of loans and for meeting other pressing cash obligations, even though the produce in their possession may not be sufficient for their needs throughout the year. Factors which do account for the sale of a part of the crop, which is none too adequate for their own consumption need, will hold good and continue to exert pressure even under the altered conditions of agricultural improvement, so that they will have to release a part of their increased production for sale in the market. Even if they put on the market a smaller proportion of a larger crop, it might not be less

hold more than at present in the circumstances assumed, i.e., in the event of enhanced production and increased income, they will not draw upon the market later to the extent of the excess they would retain over the present normal. This will reduce pressure which their demand exerts upon the market during the traditionally lean months when the annual supply approaches the point of depletion.

As for the rise in the foodgrains prices, the basic assumption that other prices will remain constant while these prices soar high, is wholly untenable. It is opposed to our common experience that agricultural prices lag hebind other prices, that they get far less for what they sell and pay for more for what they buy. The farmers stand to lose in the event of sharp and violent fluctuations in prices.

Section II-- Chapter 5.

Techniques of agricultural improvement are classified under two broad categories, namely (a) those which involve, and (b) those which do not involve, alterations in the patterns of land use. Consolidation together with the appropriate layout of the farm is included in the former category which is meant to be introduced for general adoption later on. The size of the farm and its proper layout for water conveyance, irrigation and drainage, however, have a vital bearing on improved cultural practices. These two measures which alone can provide a sound basis for agricultural improvement should, to my mind, be accorded top priority. This is far from saying that the improvements which can be adopted without any change in the land use pattern should not be pushed on until consolidation and arrangements for the distribution and use of water have

been completed. What is intended here is that operations for the consolidation and layout of the farm and for the provision of water supply should be taken in hand with the least possible delay.

There is a good deal of discussion on mechanical cultivation, large-scale farm management and the combination of individual enterprise with large-scale efficiency on the the more or less identical pattern of the Gezira cotton plantation on which individual farmers are subject to various controls. I have no mind to reopen the the issues which have been already dealt with elsewhere, i.e. in my detailed and elaborate note on the rural economy of East Pakistan. Let it suffice here to say that the impression that one gets from the discussion is " that not much can be done to increase agricultural productivity without vast institutional changes in the country-side. This is not so. The typical farm in Japan is still only between two and three acres in size; nevertheless productivity per acre on these farms is two to three times as great as in other parts of Asia.-- The secret of rapid agricultural progress in the underdeveloped countries is to be found more in agricultural extension, in fertilizers, in new seeds, in pesticides, and in water supplies than in altering the size of the farm, in introducing machinery, or in getting rid of middlemen in the marketing process." (W. Arthur Lewis, The Theory of Economic Growth, P. 136).

Large-scale farm operations in the shape of mechanized cultivation or management are devices intended to economise labour. Such devices are out of court in a low-income economy which is confronted with the acute problem of Unemployment, both visible and disguised owing to a plethora of labour vis-a-vis a restricted supply

of land; here the aim of the agricultural policy should be to secure an increase in the yield per acre by the application of techniques now known such as better seed selection and control, more use of artificial fertilizers, greater use of pesticides, and better conservation and utilization of water supplies, which are all the most important sources of gain. There can be no manner of doubt that expenditure on the provision of these aids in production and on agricultural extension would be the most productive investment in a poorer agricultural economy.

In view of the considerations urged above, it would be most desirable to concentrate our resources on the improvement of supply and extension services rather than dissipate them on large-scale farm operations which cannot be popularized without radical institutional changes. In particular, it would be very unwise and improper to dissipate our scarce foreign exchange resources, which had better be reserved for rapid industrialization. The advantage to be derived from these innovations is at best peripheral and is also contingent upon the capability and honesty of the hired management which is very much in short supply. It can never be a substitute for the self-interest and personal supervision of the farmer himself which counts so much in agriculture.

There must be a tremendous expansion in the number of agricultural officers for the efficient performance of supply and extension services (besides credit) Many very highly trained persons would be needed for research as well as for supervision and management; but the biggest expansion would be among the extension workers themselves, since one is needed for every five to ten

villages. Whatever trained technical personnel is available now and here should be employed on these services, and whatever training facilities are available should be utilized for the training of the extra technical personnel that has to be recruited to make up the aggregate number needed. For this very reason also expensive innovations such as mechanized cultivation and large-scale farm management would stand for a long time to come.

The economic justification for the recommendation lies in the fact observed that small holdings, which are economic units of cultivation, are - - - - much more productive than giant holdings. From the point of view of productivity of land there is no cogent and sound reason for a change-over to large-scale operations which present a formidable problem of supervision and management because of excessive dependence on the hired personnel. A high level of productive efficiency has been attained in Japan where the average size of the farms varies from two to three acres. Even in India where the average agricultural yield is low, very satisfactory results have been achieved, as noted by the Ford Foundation team, on some small farms operated under favourable conditions. In the words of the team, "The best in Indian agriculture is comparable to the best in other countries, but the average is unduly low. The task before the country is to develop ways of raising the low average to the higher levels that many Indian cultivators have achieved." How this welcome result can be achieved is amplified as below :-

"Many cultivators consistently obtain higher yields and higher incomes than their neighbours, even though their farms are no larger and their basic soil, water and other

resources are no better than the average for the village.

" These cultivators combine better tillage and irrigation, good seed, chemical fertilizer, pest control and other practices that are necessary for high crop yields. They practise double cropping and they grow the crops that bring them the high st return. They also feed their livestock better, consequently the bullocks do more work, and their cows and buffaloes give more milk. In other words, they have learnt the art of better management. Unfortunately such cultivators are the exception than the rule."

Here is a clear confirmation of the soundness as well as efficiency of the indigenous system of farming under such favourable conditions as allow full play to the skill, ingenuity and industry of the farmer, Such desirable conditions are conspicuous by their absence by and large because of the lack of appropriate facilities, the lack of incentives and defective organisation, both internal and external. Let all such handicaps, weaknesses and deficiencies which stare the average farmer of small means in the face, be removed, and he will have the key to agricultural progress which he would himself turn without looking up to anybody else to turn it for him.

Ours is a country of small farmers who operate on toy holdings, dislocated and fragmented and scattered far and wide. Herein lies the prolific cause of agrarian malaise:-- the chronic insufficiency of agricultural income and the ever persistent tendency of consumption to outrun production. In the context of such an unenviable situation, measures recommended for their economic emancipation must be suited to their small means and also adaptable to their environment. Little David could fight to a decisive victory

over gigantic Goliath because he was sensible enough to choose the weapon he could wield. Had he chosen the heavy armour and accoutrement of big Saul, these would have either slipped down his back or weighed him down. Looked at from this standpoint, the only wise course for us to follow is to bend our energy towards the successful dissemination of useful new knowledge with a view to the general introduction of technical improvements that add to the productivity of the soil. Investment in such and other related services would yield a far richer dividend than investment in mechanical cultivation and large-scale management which lies on the border line of estate cultivation or forced culture. To ensure the success of agricultural extension, tremendous efforts will have to be made to build up the the technical personnel needed at different levels from the highest to the lowest echelon.

The logical conclusion of the arguments so far advanced is that the new Agricultural Development Corporation should not take over any functions other than commercial, i.e. the production or procurement, movement and distribution of production requisites such as seeds, fertilizers, pesticides and appliances, improved implements, pumping sets. But more on this subject below.

Section III -- Chapter VI

The majority view is tantamount to an outright condemnation of the departments concerned, which are held to be quite unsuitable as instruments for agricultural development work. This view which is based upon a rapid survey of their past performances takes no note of the historic fact that they were never designed to function as agents of a welfare state and they do operate under formidable handicaps and weaknesses which cannot but spell administrative

inefficiency. In this circumstance, the proper course to follow should have been to consider whether they could not be remodelled and reorganised in such a manner as to improve their working and enable them to function as a suitable and effective machinery for developmental work. In this connection it was worthwhile to give due consideration to the large measure of administrative and financial decentralization which had already been sanctioned in order to improve the efficiency of the Government machinery. Nothing of the sort has been done.

The failure or comparative ineffectiveness of the departments concerned are undisputably and admittedly due, in no small measure, to serious defects and deficiencies which are remediable. They stem far and away from service and personnel management regulations and financial procedure, which are all man-made rules and by no means as unalterable as the laws of the Medes and the Persians. In fact a large measure of the devolution of both administrative and financial powers and operational control has already been sanctioned, and still more is in the offing. All such important changes do lay down the authority line of command from the top to the bottom level so as to secure effective coordination of all departmental activities all along the line for the successful implementation of a development programme. It is not at all understood why these major changes would not turn the trick in the same way as in the case of the proposed Corporation.

An amplitude of powers, privileges and facilities is recommended for the Corporation so as to enable it to function outside of routine governmental control. No such concessions are deemed appropriate for the departments which would still function in a very much wider field than

the nascent Corporation. This patent fact bears an eloquent testimony to the sort of treatment meted out to the understaffed and ill-equipped departments, which are thus more sinned against than sinning. There is no logic or justification for such differential treatment which is based upon the untenable assumption that what is sauce for the goose is not sauce for the gander.

It is conceded that the Village AID staff is of better quality, that their service is welcome to the people and that the training institutes are well equipped with suitable aids to demonstration. Nevertheless serious objection has been taken to their claim as the sole agent for extension service for all departments, and this on the ground that they have too many irons on the fire. All aspects of country life are linked together by a chain of causation, and it would be a mistake to dissociate one from the rest and thus destroy their organic character and mar the relation of inter-dependence.

It may be apprehended that the V.AID organisation would be clutterred up with too many functions and agricultural extension service would suffer in the bargain. Such apprehension proceeds upon the tacit assumption that all desirable improvements would be carried out all at one and at the same time. This can never be the case if for no other than that our resources in men, money and materials are limited. This limitation of resources would ipso facto preclude the adoption of all-inclusive and comprehensive programme, which has to be phased and spread over time on a priority basis determined at a higher level with special regard to the urgency of felt wants and needs in a particular situation. For the country as whole, the V.AID organisation, should, in the exigency of

the situation, switch over to increased agricultural production within the limits of useful knowledge extant. The range of subjects to be dealt with for the development of rural life should not be a disqualification for the V.AID staff, who have to restrict extension service to those aspects which are included in the development programme adapted to a particular local situation. These workers, who understand the needs of people feel themselves and are popular with them, are in a better position to make them appreciate the needs of the nation and inspire a sense of national urgency and self-confidence and overcome fear associated with the risk of failure of an innovation.

The Union Agent represents the lowest rung of the agricultural extension ladder under the Corporation. It is suggested in the main report that he should preferably be an agricultural graduate, although men with lower qualifications whose ability and experience mark them out are not to be ruled out. It has been already explained why it is necessary to provide one extension worker for every five to ten villages. "It would be impossible to provide these numbers if each had to be given a full university education in agriculture. But it is also unnecessary and undesirable to have university graduates for this work. It is unnecessary because the extension worker's job is only to transmit to the farmers techniques which have been thoroughly tried elsewhere. He needs to have his wits about him, and to know a good deal about practical agriculture, since he will otherwise be ineffective with the farmers. The best training for this is to have worked on a farm himself, doing all the farm jobs, and then to have spent a year or at most two being trained in the new techniques. It is also undesi-

able that the officer be a university graduate, since his main problem is to make contact with the farmers and be accepted by them, and this is much more difficult for a university graduate than it is for someone whose background is not far removed from that of the farmers themselves." (W. Arthur Lewis, ibid page 189).

It is very necessary and important to bear in mind in this connection that the extension worker's main problem is to make that contact of minds which results in imitation. For this purpose he must persuade the farmers or the more progressive farmers from among them to try out the innovation themselves on their own holdings." It is then clear to the remainder that good results have been achieved by farmers just like themselves on holdings just their own. The success is no longer the success of a remotely controlled institution, it is the success of their neighbours, and hence it calls for gossip, interest, investigation, discussion, and emulation."(Arthur Lewis, ibid page 190)

Judged by the criteria laid down above, the Village AID extension worker, who is trained in the twin themes of Motivation and Participation, is better qualified for agricultural extension than either an agricultural graduate or deploma holder. For this very reason the V.AID organisation should be the sole agent for extension service for all departments. Agricultural extension has to be seen" only as one part in a wider programme of agricultural improvement , which includes such other things as roads, agricultural credit, water supplies, efficient marketing, land reform, the development of new industries to absorb surplus labour, co-operatives, and so on. Economic growth always involves change on a

wide front, and of no sector is this more true than it is of rural life."

Section IV-- Chapter 7.

In the view that is taken in this note, it would be most inadvisable for the nascent Corporation to clutter itself up with too many functions at one and the same time. As already explained, the best result would be achieved by the concentration of resources and efforts on technical improvements related to the productivity of the soil. For the attainment of this goal the Corporation will have to arrange the production or procurement, movement and distribution of huge quantities of seeds, fertilisers, plant protection materials, improved implements, etc. Storage accommodation will have to be provided for all these supplies throughout the country.

In West Pakistan the Corporation will have to take over and organise and manage seed farms and cattle farms which together cover more than one hundred thousand acres of land. There is, in addition, the big problem of colonisation of vast new areas which have been opened up by costly irrigation projects already completed.

Each of the three projects just mentioned is a stupendous task. The successful implementation of these three projects, which would strain our scarce resources to the utmost, will be a glorious achievement for the new Corporation, which will thus have more than enough work to worry over without the addition of any extra major project.

The Corporation is to focus attention on the long-term solution and proceed by stages on the project basis in selected areas. This leisurely mode of approach destroys the sense of emergency implicit in the imminent

food crisis which demands that "our rate of progress must no longer be at the bullock cart standard, but at least at the pace of the handy and serviceable jeep." (Lord Wavell as Viceroy of India.).

No indication is given as to what would happen after the completion of a project--what sort of administrative set up would be there for follow-up work. Would it be the responsibility of the departments, who are required to withdraw from the project area?. Would not the project area lapse into stagnation for want of team spirit and effective coordination, which are the central core of the package deal and the Corporation approach; The departments would know nothing of either, since they would be out of touch with the progress of work in the project area.

Section V -- Chapter 8

Since the Corporation would operate on the project basis in selected areas, the departmental agencies would have to operate in a very much vaster area, It is of highest importance that these agencies, who all work in isolation are so organised that they work together in the interest of heightened agricultural production.

It is admitted that the District team approach is the best for immediate action, which is called for to meet the food crisis. Relief has already been granted to the District Officer by the appointment of Additional Collector (Revenue) and Dy. Director, NDO. A large measure of administrative and financial decentralisation and operational control over the implementation of the development programme at the divisional and the district level has already been sanctioned and further devolution of powers will follow in due course, The District Officers will thus be in a position to exercise effective control

over the technical representatives at the district level for the purpose of effective coordination so very essential to agricultural improvement, and also to remove the bottlenecks that impede the progress of work. The selection of fit persons in fit places is, however, essential. It must be borne in mind that the District Officers who are all of equal status cannot all be of equal stature.

The emergent need for intensified food production demands the immediate organisation of the extension service with a reassignment of tasks and reallocation of resources at the block level as noted below :

(a)The principal development officer should be an able and experienced agricultural graduate, who should be assisted by a team of subject-matter specialists.

(b)The composition of the team of specialists should vary with the needs of the block. Generally speaking, it should consist of an animal husbandry officer, a cooperative officer and a special extension officer.

(c)The animal husbandry officer should lay greater emphasis upon poultry and milk production, forage cultivation controlled grazing, better feeding and care of the livestock than upon the routine veterinary and allied services.

(d)The cooperative officer should teach and counsel the villagers and help them in the organisation of cooperatives on sound business lines. He should be responsible for the supply functions which the Agricultural Officer should shed to him as well as for credit and marketing services. The Corporation which is to be entrusted with the wholesale distribution of production requisites should deliver same to the cooperative officer for retail distribution to the farmers through the

cooperatives to be organised in this behalf.

The close and intimate liaison between the Corporation and the cooperative organisation should be a most important plank in the cooperative development plan and programme. The cooperatives would be strengthened if used as Government Agents for buffer stock operations. The producers' cooperatives can be linked with the consumers' cooperatives in the urban areas so as to narrow the spread between the prices paid at the village level and at the point of consumption.

The cooperatives should receive requisite financial and technical assistance from the State. These should be manned by capable officers trained in business and farm management.

(e)The special extension officer should serve as a staff officer under the team leader and assist all other specialists in organising facilities and preparing materials, visual aids and other teaching techniques with particular bearing on food production. He should train the village workers in organisation, method demonstration, etc. In this role he should perform a staff function and render service to selected programmes rather than carry our particular programmes alone.

Section VI-- Research.

Data on production and market supply, on consumption and demand and on prices are quite inadequate. The deficiencies are especially acute at the village level. No accurate information is available on the resources used in production and the quantities of each agricultural commodity produced by the farmers, the commercial supply, the price paid at the village level, the quality of the produce, the losses in transit and storage between the time of harvest and consumption, seasonal changes in

prices. Further light will be thrown on the estimates of yields which depend on weather and other seasonal factors. These factors determine the marketable surplus which becomes the commercial supply.

On the demand side factors which need critical study and investigation are the size and growth of population, distribution by age groups, urbanisation and movement, national income and expenditure, money supply, velocity of circulation, bank credit and public and private savings and investments, employment and distribution of wealth and income-- all bearing on purchasing power. These data need be supplemented by those associated with consumer behaviour in urban and rural areas, price and income elasticities of consumption by population groups and how far foodgrains can be substituted one for the other. All such information is necessary for a forecast of changes in per capita consumption of foods and other commodities.

The search for a correct solution of the food production problem has to be conducted against the background of the huge concentration of productive resources on agriculture, the low level of agricultural production, the chronic deficit in the food supply, the chronic insufficiency of agricultural income and the ever persistent tendency of consumption to outrun production owing to the inadequate return to the average farmer, and so on and so forth.

The issues which call for a most careful and anxious consideration may be stated in brief and in general terms:

(a) What incentives are necessary to induce the farmers to carry out improvements required for expanded production?

(b) What institutional changes are necessary to induce the farmers to do their best for the attainment of the production goal?

(c) How can agricultural cooperation be organised to emancipate the farmers from their economic bondage?

(d) How can the marketable surplus be increased and moved in an efficient manner to the point of consumption.

(e) What are the comparative costs and returns from a variety of programmes of education and assistance.

These and other related problems call for detailed systematic study by trained specialists with a view to the discovery of causes and probable remedies by scientific economic analysis. Adequate personnel and funds must be provided for systematic economic enquiry to make up the palpable deficiencies in agricultural economics so as to make available reliable analytic results for decision making.

The satisfactory performance of this vast and complex task calls for a strong, well-equipped organisation manned by competent specialists who have made their mark in their own special spheres. A council of economic research backed by an independent economic division is indispensable. This organisation may be placed under the Administrative Secretary who is also in charge of scientific research.

The case for an independent organisation for economic research rests upon the conviction that the economic aspects of the intensified agricultural production problem are apt to be otherwise lost sight of. This is too evident from the main report itself, which focuses attention on technical efficiency or physical increase in the acre-yield as the criterion of agricultural improvement. But is there a certainty that such an increase will yield a higher net return also to the farmer, who is more interested in the profit than the out-put? This is an economic decision which is influenced by the former's

expectation of " the value of the total output of the farm as a whole expressed as a function of the total inputs of land, capital and labour used in its production." (Edgar Thomas). There is thus a clear distinction between technical efficiency, which is desirable as a means to an end and economic efficiency, which is the ultimate determinant of agricultural ogress. It is a sad pity that this vital aspect of the ricultural problem does not receive sufficient nsideration in the main report.

SUMMARY AND RECOMMENDATIONS

Summary of Chapters 1 to 6

Chapter 1 - The Food and Agriculture Commission

The terms of reference of the Commission are given with brief reasons for its being set up. Methods of working are described and an outline of the arrangement of the report is given.

Chapter 2 - Difficulties and Achievements of Pakistan since Independence

A historical survey is made of developments since Independence. The very considerable progress made in commerce and industry is outlined and is compared with the very limited development in agriculture. The reasons for the slow progress in agriculture are briefly discussed.

Chapter 3 - The National Need for Increased Agricultural Production

1. The basic importance of agriculture in the economy of the country has not in the past been fully realised. Food problems are analysed in some detail as is the importance of agricultural production in the national economy and the contribution which it would make towards economic growth. The steady rise in population in both wings has resulted in an increased demand for food but crop yields have remained almost static and thus food had to be imported in increasing quantities requiring the expenditure of foreign exchange. The quality of the diet of most of the people is not satisfactory being too largely made up of cereals (Paras. 1 - 20)

2. Agriculture contributes 57 per cent to the total national income. Incomes in the agricultural sector of the community are very low, much lower than in the non-agricultural sector, and are also rising more slowly. There is very little chance inside agriculture, under present circumstances, of the formation of capital needed for development. On a five year average exports of agricultural raw materials form 70 per cent of the total exports and manufactures of cotton and jute a further 10 per cent. Jute and cotton are the principal exports followed by tea, hides and skins, and wool. There is some export of superior rice. Foreign exchange

3. The need for greater foreign exchange earnings both by reducing expenditure on imported food and by increasing exports cannot be over-emphasised. Agricultural development must be given a very high priority and all possible measures taken to increase crop production and to improve processing and marketing. The use of the large volume of under-employed labour in development works has to be considered. Continued industrial expansion will largely be dependent on internal markets and only a prosperous farming community, at present forming 75 per cent of the population, can supply this. (Paras. 33 - 51)

Chapter 4 - The Present Position of the Farmer

The present position of the farmer is discussed under the following natural regions (Paras. 1 - 2):-

1. East Pākistan (excluding Chittāgong Hills)
2. Canal Irrigated Plains of West Pakistan
3. Sub-montane Regions of West Pakistan
4. Range Lands of West Pakistan
5. Hill Catchment Areas of West Pakistan
6. Chittagong Hill Tracts of East Pakistan

1. East Pakistan (excluding Chittagong Hills). In the intensively cultivated areas of East Pakistan there are rich soils, and heavy rainfall which, however, is unevenly distributed and winter cultivation can only be done with the aid of irrigation which is as yet undeveloped. An outstanding feature is the pressure of population which rises as high as 1,500 people to the square mile in some areas, resulting in very small holdings which are continually being sub-divided and fragmented until they are uneconomic as farms. Yields are very low, bullocks are under-fed and farmers have to concentrate on the growing of rice. The lack of good communications and of regulated markets worsen the position of the farmer as he is often unable to secure a fair price for his crops. The terms of land tenure or of land hiring (the bargadar system) discourage improved cultivation. (Paras. 3 - 12)

2. Canal Irrigated Plains of West Pakistan. There are in West Pakistan some 24,000,000 acres of irrigated land which is 64 per cent of

the total cultivated area. In the older colonies in the Punjab there is over-crowding and farms are small and fragmented though the position is very much better than in East Pakistan and there are still large undeveloped areas adjacent. The land tenure system in districts where there are large estates again forms a disincentive to the use of improved methods and increased production. Communications and marketing arrangements are better in the Punjab than elsewhere but require attention everywhere. The great menace throughout the area is spread of salinity and waterlogging. This is in the main due to the system of irrigation practised and to the lack of drainage. Already some 11,500,000 acres are affected of which some 3,000,000 are out of cultivation altogether. The rate of spread is considered to be increasing and is now estimated at 100,000 acres per year. From a national point of view it is the most serious technical problem facing the country and measures to correct it are not being applied to any appreciable extent. (Paras. 13 - 29)

3. Sub-montane Regions of West Pakistan. These cover some 15,500,000 acres of which about 46 per cent are cropped. They make a considerable contribution to production. Most of the cultivation depends on rainfall which comes in two seasons but is not always sufficient to ensure good crops. Where there is irrigation from wells and canals or from dams the land is intensively cultivated and densely populated. Holdings are small and fragmented. Soil erosion has destroyed or reduced in value a large proportion of the fertile land. The general picture is of over-crowding on cultivated land, of dependence on a hazardous rainfall and of great and increasing damage by erosion. (Paras. 30 - 39)

4. Range Lands of West Pakistan. Where irrigation water is available there is intensive cultivation of food crops and of fruits and in the areas of higher rainfall there is uncertain barani cropping. The main part of the area is given over to grazing and in general has been so mismanaged and overgrazed that it has fallen to a very low level of production and the huge area contributes much less than it should do in animal products.

Communications and marketing are very poor. (Paras. 40 - 46)

5. Hill Catchment Areas of West Pakistan. Cultivation is confined to the banks of streams and rivers and usually requires terracing which is seldom done sufficiently well to control erosion. Remote areas are covered with forest or scrub but elsewhere uncontrolled cutting of the forests and indiscriminate grazing have denuded the soil of protective covering. Livestock is inferior in quality because of poor grazing management and because the smallness of the holdings does not permit the growing of fodder crops for use in winter when there is almost no grazing. (Paras 47 - 53)

6. Chittagong Hill Tracts. This is a relatively undeveloped area of considerable production potential both in timber and bamboo and in special fruit crops. The present system of exploitation is very wasteful and the need for planned development obvious. Communications and markets are almost non-existent. (Paras 54 - 56)

7. General. In spite of these handicaps farmers are alive to the needs of the situation, and are prepared to try new techniques if these are brought within their reach and properly demonstrated to them. (Paras. 57 - 60)

Chapter 5 - Techniques for Increasing Production

In general it may be said that yields in Pakistan are amongst the lowest in the world and show no upward trend. Past Commissions and Committees have advised how yields could be raised by methods well known and practised throughout the world. These methods with a proper organisation to ensure that plans and methods are implemented, are also the basis of the Commission's recommendations. The problem of how production can be increased is discussed under the following headings (Paras 1 - 3):

I. Existing Cultivated Areas
II. New Colonisation Areas
III. Range Lands
IV. Hill Catchment Areas
V. Areas and Subjects Requiring Special Consideration

I. Existing Cultivated Areas. These contain the vast bulk of the present producing areas and of the population. The improved techniques recommended for use are divided into two groups; those which can be applied without altering the present patterns of land use and those demanding alterations in the present patterns. In the first group are better seed, fertilizer, plant protection, better cultivation and short and medium term credit. The need to bring inputs to the farmers in the village as a package deal is emphasised. (Paras. 5 - 9)

(i) (a) Methods of producing and distributing improved seed are discussed. The need for research and multiplication facilities on an adequate scale are set out as is also the need for a proper testing and certification system. (Paras. 10 - 32)

(b) The great increases that can and are being obtained by the application of balanced fertilizers are described. Further trials are required but results to date have been very promising. There is great need to step up fertilizer use, and steps necessary to do so are discussed. Above all, what is needed is an efficient organisation to take supplies down to the villages, sell them if necessary on credit and demonstrate and supervise their use. (Paras. 33 - 42)

(c) Plant protection measures are of great importance as losses from pests and diseases are high, but as yet they are not widely applied. Farmers should, wherever practicable, be taught to carry out their own protective spraying and such work in some cases may have to be made compulsory. Large outbreaks should continue to be a responsibility of government. (Paras. 43 - 49)

(d) The value of cultivation in securing a proper tilth for a seed bed and in controlling weeds is emphasised but implements are inefficient and bullocks are weak. The value of line and ridge sowing is known but is not widely practised. Improved implements of suitable size are required for a number of operations and action regarding their design, manufacture and marketing is necessary. (Paras. 50 - 57)

(e) Even if better seeds, fertilizers, plant protection materials and improved implements are available, farmers will only be able to use them on a large scale if supplies are readily available on credit. To make them more effective supervision of credit will be necessary. (Paras. 58 - 61)

(ii) The group of techniques which demand alterations in the present patterns of land use are consolidation, improved farming patterns, mechanisation, irrigation and reorganisation of farms. (Paras. 62 - 63)

(a) Fragmentation acts as a serious handicap, and consolidation becomes necessary. Methods of consolidation, present and proposed, are indicated. (Paras. 64 - 76)

(b) Mixed farming and diversification of cropping systems are necessary to increase total production. The reasons for present

systems and the changes required to allow improvements to be introduced are examined. The development of animal husbandry on mixed farms and the value of different breeds of cattle, including buffaloes and foreign breeds, is discussed at some length. The importance of disease control and the need for a bigger and better equipped service to deal with this is emphasised. (Paras. 77 - 119)

(c) In barani lands the possibilities of more intensive farming by the greater use of fertilisers and green manuring is suggested as is also the use of rotation including pasture. The outstanding need for soil and water conservation measures is set out. (Paras. 120 - 134)

(d) Introduction of machines could greatly increase the intensity of cropping as well as per acre yields, and areas at present almost unused could be brought under cultivation. This would create new employment probably to a greater extent than manual labour displaced. It would also allow draught bullocks to be replaced with more directly productive livestock. Extension of its use would to some extent depend on consolidation of holdings and on the introduction of cooperative or combined farming systems. (Paras. 135 - 150)

(e) Irrigation can play an enormous part in increasing production. In East Pakistan there is a net-work of waterways but during the winter months, when no rain falls, little cropping is done. If irrigation water were supplied it would be possible to greatly increase the intensity of cropping and also to make the present aus and aman rice crops much more secure. There are a number of schemes under investigation and the engineering phase of Ganges-Kobadak Project is nearing completion. There are also smaller projects for irrigation by power pumps and from tubewells and tanks. An essential for the success of all these schemes is the proper education of the people in the use of irrigation water, the adjustment of farming patterns and rotations, the proper layout of field channels and drains and the levelling of the land. To achieve the best results consolidation will be necessary. In West Pakistan barani areas the possibilities of irrigation irrigation. The present canal colonies in West Pakistan need crop planning beyond the canal outlet point. Methods of dealing with salinity and waterlogging are discussed as is the need for new cropping systems to get maximum yields and keep soils in good condition. (Paras. 151 - 202)

(f) Systems of farming where the benefits of large scale operations and of modern farming methods can be enjoyed by small farmers, such as cooperative farming and block farming, need to be developed through intensive action. (Paras. 203 - 209)

II. New Colonisation Areas. The same improved techniques can be applied here as in the existing cultivated areas but in addition other advantages may be gained. There is need to look upon such projects as primarily production projects and the selection of settlers and the fixing of the terms of land allocation should be made with this in view. It may be possible also to ensure that farms conform to a layout and rotation which

will give an opportunity for the use of joint planning in farming. Organised managerial service, which could also control marketing and processing, would bring about higher yields and incomes. (Paras. 210 - 216)

III. Range Lands. Grazing control is necessary if a valuable asset is not to be wasted. Additional watering points should be provided wherever possible to enable grazing to be better utilised. Wherever irrigation water is available it should be used for growing fodder crops to be fed to livestock during the seasons when grazing was insufficient. This would enable much better and less hazardous use to be made of the enormous grazing areas. From the agricultural point of view Powindah migration is harmful.

IV. Hill Catchment Areas. The dense population in the limited cultivated areas, the denudation of the hills of all cover by the felling of forests and by over-grazing and the lack of communications, are the main problems here. Action is required in the catchment areas if streams are to remain perennial and excessive floods avoided. (Paras. 244 - 252)

V. Special Areas and Subjects. Better use can be made of areas such as riverine lands, haor and polder areas of East Pakistan, and the Chittagong Hill Tracts. Possible extension of tea acreage and of timber reserves in cultivated areas have to be tried out. The great potential value of the fishing and the poultry industries needs to be stressed. (Paras. 253 - 290).

2. The picture which emerges from this review of improved techniques is that if these techniques could be adopted and a number of disabling factors removed, then the country could look forward to more than doubling the yields of its main products. The key to the whole problem would appear to be the setting up of an organisation which can ensure that the desired policy is really implemented. Two general considerations can assist in this. One is that government must help by providing supplies and credit, removing obstacles such as salinity, waterlogging and flooding, unsatisfactory land tenure conditions and fragmentation, and by providing

facilities such as irrigation or improved water supplies for existing irrigation areas. The other is that the farmer and landowner must change their attitude to land usage; there must be more emphasis on their duties from a national viewpoint and less on their individual rights. (Paras. 292 - 306)

Chapter 6 - The Tools for the Job

In this chapter an assessment is made of the suitability of the present departments and organisations to bring about the desired increases in production. The general attitude in the country towards agriculture is an important factor affecting development. There is little sense of urgency in the matter outside top government circles and in general there is a tendency to attach little importance to the farmer or to his work. Businessmen have not wished to invest in agricultural services or development and youngmen in choosing a career have put the agricultural services at the bottom of their list. The low status accorded to agriculture has influenced the allocation of funds and the attention paid to the advice of agriculturists. (Paras 1 - 10)

2. The work of the main departments and organisations concerned with agricultural development are reviewed. (Para. 11)

3. The Agriculture and Animal Husbandry departments have operated as minor provincial organisations and have been starved of funds. Research and training facilities have been inadequate. Extension staff of the Department of Agriculture are very thin on the ground and those of Animal Husbandry even thinner. The lowest grade of staff are poorly trained, badly paid and given very few facilities for doing their job. Transport, stores, offices, laboratories, etc., are lacking. Agricultural staff who should be in the field are given store-keeping and accounting duties in connection with supplies. Seed farms and stock breeding farms are inadequately financed and men at the lower level denied the authority necessary for efficient management. Research is controlled and carried out by a number of different bodies and while some useful work has been done, it

is not on a scale to meet the needs. There is a lack of overall planning and control which results in a diffusion of effort and of the limited funds available. Conditions of service and prospects of advancement for research workers are so poor that the best men are either not attracted to research or after specialised training transferred to other posts. (Paras. 12 - 74)

4. The Irrigation Department has a much higher status and is relatively well equipped to carry out the engineering aspects of its work. Unfortunately, its work largely ceases at the canal outlet points and little is done to ensure the best use of water by seeing that efficient distribution systems are made, by levelling the land to ensure uniform water distribution or by advising in the amount and timing of water applications for various crops. The result is that crop yields fall far below what they should be and much water is wasted. There is great need for an organisation that can help farmers and the country to make the maximum use of irrigation water and such an organisation should be set up early in view of the need in West Pakistan, because of salinity, to alter water use and cropping patterns and, in East Pakistan, because of the development of new irrigation systems. (Paras. 75 - 92)

5. The Cooperative Department is, in pay, status and facilities similar to the Department of Agriculture. It is also poorly supplied with loan funds. Except in limited areas, cooperatives have taken little interest in agricultural production and have confined themselves mainly to supplying credit. Until there is more efficient business management of societies they will be unable to play the leading part in development which they should. (Paras. 93 - 106)

6. The present government agricultural credit institutions suffer from a number of weaknesses from the point of view of production. The chief of these are: the number of formalities to be gone through before a loan can be issued, the fact that it is almost impossible for tenants to secure development loans and the non-supervision of the use of loans

when they have been given. A new organisation closely connected with agricultural production is needed which should be able to overcome these difficulties, issue loans more quickly and freely and supervise their use. (Paras 107-114)

7 Village-AID is unique amongst departments in that it has a reasonably satisfactory establishment, both in number and training, at village level in the limited areas in which it operates. Inside its own fields of motivation and encouragement, it can greatly assist the production drives. It cannot, however, take the place of a supply service or technical agricultural extension service and it has too many important responsibilities. If it can effectively deal with the non-agricultural sector, it will assist the production drive. Similarly, while the National Development Organisation and basic democracies can be of great assistance by giving their support to development plans, they should not be involved in an executive or controlling capacity in such projects. (Paras. 115 - 127)

8. The Revenue and General Administrative Service is well staffed and organised and has facilities for carrying out its work. In accordance with tradition, general responsibility for agricultural development falls on it but it is very fully occupied with administrative and routine duties. In considering the value of a team approach, with the Revenue Officer at the head, due weight must be given to his present very full-time duties and the resultant danger that this important and urgent need to increase production will become just one amongst many tasks and will not receive the attention it demands. There are many advantages of having a separate technical organisation not tied closely to the revenue service to take charge of agricultural development. In the present undeveloped state of the country, government has to be the initiator and controller of development. There are unfortunately some aspects of government service which are at variance with a development need. Its outlook is that of a giver of law and order, not that of a go-getter or efficient business machine in matters of planning, finance, supplies and staff. The present

systems of working are designed to avoid mistakes rather than to assist progress and, as a result, there is over centralisation and a delay in making decisions. This is particularly so regarding finance where a budget comes to be looked upon as a plan for control rather than a plan for facilitating development. There is also a tendency to separate the administrators from the technicians with a resultant depressing effect on morale. There is over-emphasis on seniority which results in too great a sense of security and offers too little reward for enterprise and intiative. (Paras. 128 - 156)

9. As it is not possible to reorganise existing services to the extent needed a new service will have to be built up which can operate without these handicaps. It is, therefore, necessary that an Agricultural Development Corporation should be set up as an autonomous body outside the present government services. This Corporation should be looked upon as a body which can create for farmers the conditions which will enable them to fulfil their duty to the nation and raise their own standards of living. It will take over the work at present being done by a number of different departments and deal with each project under a comprehensive and coordinated plan. (Paras. 157 - 172)

Summary of Recommendations
Chapters 7 to 12

Chapter 7 - Agricultural Development Corporations

I. Functions and Scope

The Commission recommends that an Agricultural Development Corporation be set up in each province and that the Federal Areas of Rawalpindi and Karachi form parts of the West Pakistan Corporation. (Paras. 1 - 4)

2. The financial backing for the Corporations should be provided from the Central budget. (Para. 5)

3. Suitable arrangements for liaison between the two Corporations should be made. (Para. 6)

4. The Corporations will organise essential supplies to the farmer and provide him with technical knowledge for increasing production. Each Corporation will have one Supply Wing and one Field Wing. (Para. 7)

5. The Supply Wing would produce, procure, transport and distribute seeds, fertilizers, plant protection materials and farm implements throughout the country. Suitable depots will be built in each Union. A large part of the supplies would be advanced on credit. The depot should become the centre for the hiring out of agricultural implements and machines. The Supply Wing would extend its operation all over the country as quickly as possible, but its first attention would be devoted to those areas where the Field Wing will start operating. (Paras. 8 - 9)

6. The control of all Seed Farms and Livestock Breeding Farms should be transferred to the Corporations. (Para. 10)

7. The Field Wing should operate in selected areas which should be notified as 'Project Areas' by the government on the recommendation of the Corporations. In these areas, they will ensure intensive and coordinated use of the "five firsts", including supervised credit. The problems of land reclamation, range management, soil conservation, irrigation management, organisation of agriculture in new colonies, harnessing of hill streams, conservation of catchments and exploitation of potential

areas will be tackled by them as also planned agriculture through suitable crop rotations and mixed farming. Organisation of marketing and processing and the creation of cooperatives would be the other objectives. Small farms will be reorganised through cooperatives or through large blocks for joint planning. (Paras. 11 - 13)

8. The Corporations should work out a planned training programme for their staff well ahead of actual operations. They should have also the freedom to select personnel from all sources and particularly from the Departments of Agriculture, Animal Husbandry, Cooperation, Forestry and Fisheries. (Paras. 14 - 15)

9. The Corporations should be free to operate their budgets but there should be a strict accounting system at all levels and provision for adequate supervision and efficient periodic external audit. (Para. 16).

10. There should be continuous evaluation of the work of each project. (Para. 17)

11. The legislation setting up the Corporations should, among other things, provide for the following (Para. 19):

(a) continuity of programming and planning;

(b) the Corporations will work on properly prepared budgets approved by government with proper external audit arrangements through a competent audit organisation;

(c) the Corporations will have an assurance of continuity of financing and freedom from red-tape especially in the sphere of financial sanctions;

(d) the Corporations will have the power to recruit and remove personnel, decide salary scales, and provide facilities as they deem necessary;

(e) there will be provision for the delegation of large administrative and financial powers to lower echelons;

(f) power to set up subsidiary organisations;

(g) power to enter into commercial transactions and to borrow money;

(h) the Supply Wing of the Corporations will take over control of all the seed and breeding farms in the country;

(i) the Supply Wing will operate throughout the country as soon as possible, with powers to hire transport, build depots and enter into contract for the supply of their requirements;

(j) the Corporations will have power to set up or encourage the manufacture of such materials as are necessary;

(k) the Corporations will encourage the development of private and co-operative trade to handle supplies;

(l) the Field Wings will assume responsibility for agricultural development in areas notified by government as Project Areas, and exercise powers of control over allied departments;

(m) government will delegate to the Corporations such powers as are necessary to enable them to carry out the task of increasing agricultural production.

II. Relations with Other Departments

12. The project staff will replace the agricultural extension service in the Project Areas, and take over such of the latter's staff as are found suitable. The staff of the Departments of Animal Husbandry, Co-operation, Fisheries and Forestry in the Project Areas must work in close cooperation with the project staff, and to this end they must be placed under the complete operational control of the Project Director. (Para. 21)

13. The head of the district in which a project is situated should exercise his normal power of informing the government and the higher ranks of the Corporations of failures and mishandling of a situation by the project staff, but there should be no interference in the normal working of the programme. (Para. 22)

14. The Irrigation Department in West Pakistan and WAPDA in East Pakistan must continue to be responsible for providing an adequate supply of water at each canal outlet, but beyond that point, they should have no further dealings with the farmer. The project staff should be responsible for settling disputes about turns of water and for taking up complaints of shortages of water supply with the irrigation authorities. The operations of tubewells and lift pumps will be the responsibility of the Corporations in Project Areas. The project organisation should be allowed to construct its own buildings. (Para. 23)

15. The agricultural credit institutions, such as Agricultural Development Finance Corporation and the Agricultural Bank, should continue to operate in the project areas for larger farmers. (Para. 24)

16. The project programme should be closely linked with both Village-AID and basic democracies and make use of their facilities for propaganda and community action. The Village-AID should withdraw from the agricultural field and the basic democracies should have no responsibility for the actual execution of the agricultural programme. (Para. 25)

III. Structure of the Corporations

17. Each Corporation should have a Board of three full-time Directors, selected for their ability to get a job done and their knowledge of agriculture, and appointed by government for a specific period of time. This Board will be the supreme body of the Corporation and responsible for all final policy decisions. The Chairman will be the chief executive of each Corporation and will be given wide powers to take action on behalf of the Board in order to expedite work. (Para. 26)

18. The Supply and Field Wings will be headed by General Managers. The General Manager of the Supply Wing will have under him separate divisions, each under a Divisional Director for management of seed and livestock farms, seed production both in and outside the Corporations' farms, procurement of other supplies, management of depots and movement of supplies and engineering materials. (Para. 27)

19. The Farms Division will employ suitable farm managers and breeding experts from either within the country or outside of it. (Para. 28)

20. The Seed Division will coordinate the whole seed programme, select registered growers, observe legal formalities, acquire seed and pay proper prices. (Para. 29)

21. The Procurement Division will procure supplies other than seeds including fertilizers, plant protection materials and equipment, agricultural implements, etc. (Para. 30)

22. The Depot and Movement Division will build depots at the union level, and central stores at suitable distribution points all over the country. Each union will have a Store-Keeper-cum-Accountant to keep accounts of sale and credit. There will be a District Supply Officer to

supervise the work of the Division in the district and to maintain liaison with the district authorities. Other supervisory staff may be appointed as necessary. (Para 31)

23. The Engineering Division will establish an organisation to bore tubewells and install power pumps for private farmers throughout the country. It will provide machines for reclamation or for occasional ploughing. The existing agricultural workshops in the provinces, and tractors will be taken over by it. (Para. 32)

24. Separate sections for planning and training should be created in the Supply Wing. (Para. 33)

IV. The Programme of the Field Wing

25. The Field Wing will operate through Project Directors who will be in-charge of projects. At the headquarters there will be a Research Division to keep liaison with research organisations and to provide the services of research specialists to be attached to each project in accordance with its needs. It will also arrange for such research and surveys as are specially required. (Para. 34)

26. The Field Wing should have a Planning Division to work out the future programme carefully, to assess the requirements of training and supplies, and to prepare schemes for training. (Para. 35)

27. The Field Wing will also have a Projects Division. Each project will be headed by a Project Director who will be an officer of high status, not less in rank than a senior class I officer. Each of these projects will be treated as a separate division of this wing. (Para. 36)

28. The union level worker of the Corporations may be called a Union Agent. His pay scale should be equivalent to that of the Agricultural Assistant in West Pakistan. The Union Agents should preferably be agricultural graduates, but men with lower qualifications whose experience and ability mark them out may be recruited. Suitable farmers may also be selected for these posts or some of the higher posts, provided they possess the knowledge, efficiency and energy. (Para. 37)

29. Between the Union Agents and the Project Director at least one echelon will be necessary and it may take the form of an officer of the grade of a class II officer, over every 10 to 15 Union Agents. In each Project Area, there should be a suitable number of specialists who should be drawn from research organisations and maintain an effective liaison between research organisations and the Union Agents. (Para. 38)

30. The Administration Wing will handle the problems of budget and accounts, interpretation of rules and regulations, recruitment of personnel, maintenance of leave records, and liaison with other training organisations. This wing should include divisions for budget and accounts, training problems and personnel management. (Para. 39)

31. The Budget and Accounts Division would specify the levels at which various accounts would be kept and the forms in which they would be maintained. It will arrange for audits at regular intervals, and prepare the annual budget and other statements for submission to and approval of government. It will also deal with the issue of credit by the Corporations. (Para. 40)

32. The Training and Personnel Management Divisions would keep touch with training organisations within and outside the country and handle personnel matters and administrative details. (Para. 41)

33. There should be adequate devolution of financial and administrative powers to the Project Directors. (Para. 42)

V. The Programme of the Supply Wing

34. The Supply Wing will set up union depots all over the country. It should handle only good quality material. (Paras. 44 - 45)

35. A Pure Seed Act should be promulgated with the object of laying down standards of quality and procedures governing the production and sale of seeds. A provision should be inserted giving powers to government to declare an area to be a Seed Area in which if will be obligatory on farmers growing a specified crop to use only seed supplied by the Corporations and to sell the produce back to them. The Seed Law should be

administered by government which might delegate some of its powers to the Corporations. (Para. 46)

36. A series of seed testing laboratories should be set up by the Corporations to ensure purity of seed both when it is purchased by them and when it is sold from the depots. They will also have to maintain grading and cleaning machinery at convenient points. (Para. 47)

37. The production of new varieties will be the outcome of research, and research will decide which varieties should be multiplied and introduced. (Para. 48)

38. At the Corporation farms for the production of foundation seed for multiplication, the breeder should be given every facility to supervise the production. (Para. 49)

39. As regards sale price of seed a premium will have to be paid over and above prevailing market prices. The sale price will normally be higher than the market price but it may have to be subsidised at times. (Para. 50)

40. Until research points to a different conclusion, the present programme of renewing the seed of self-pollinated varieties, such as wheat and rice, every 5 years should be followed. (Para. 51)

41. The development of a jute seed programme will depend upon further detailed studies. (Para. 52)

42. As soon as the Seed Act is promulgated, the West Pakistan Corporation will apply itself to the problems of cotton seed production, ginning and storage. The powers of control over cotton seed production in the proposed Cotton Act may be delegated to the West Pakistan Corporation. (Para. 52)

43. The Corporations will make local arrangements for the supply of sugarcane cuttings. (Para. 53)

44. The West Pakistan Corporation should take over the job of setting up of machinery procured for a hybrid maize programme. The Corporation should develop a seed programme for hybrid sorghum also. (Para. 54)

The requirements of berseem seed are likely to increase with the improvement of crop rotations and the introduction of mixed farming. (Para. 55)

46. Special attention should be given to the production of vegetable seed and nursery fruit plants. (Paras. 56 - 57)

47. The Corporations will take charge of all fruit nurseries maintained by the Departments of Agriculture. (Para. 58)

48. The Corporations should try to build up cooperatives and private trade to gradually take over the production of seed. (Para. 59)

49. The fertilizer factories at Multan and Fenchuganj should be expanded to meet expected future requirements. Consideration should be given to the need for manufacturing larger quantities of phosphates and potash within the country. In the meantime, imports of fertilizers must go on at an increasing rate. (Para. 60)

The prices of fertilizers should be fixed as follows:

East Pakistan
Rs. 12/- per bag of 50 kilos of urea
Rs. 12/- per bag of 50 kilos of triple superphosphate

West Pakistan
Rs. 7/- per bag of 50 kilos of ammonium sulphate
Rs. 6/- per bag of 50 kilos of single superphosphate (from Lyallpur factory)

These prices should be maintained till 1965. (Para. 61)

51. While in the early stages, plant protection service will be free, efforts should be made to persuade the farmer to hire equipment and purchase chemicals. Credit should be provided for this purpose. It may sometimes be necessary to give powers to the Corporations to enforce the use of plant protection measures when considerable damage to crops is anticipated. (Para. 62)

52. The Corporations will arrange the manufacture and supply of implements for improved cultivation to depots. (Para. 63)

53. The Supply Wing will organise the supply of pumps in East Pakistan and tubewells in West Pakistan and arrange for their maintenance. (Para. 64)

54. The seed and livestock farms may be combined for purposes of administration and used for production of seed, cattle and poultry, and development of mixed farming techniques. (Para. 65)

55. The Supply Wing will maintain sufficient transport of its own to meet emergency needs and supplement private and public transport. Agreements with railway authorities for priority treatment for movement of supplies, and with private transport for movement on roads, will be made by this wing. (Para. 66)

56. The Corporations will encourage the expansion of the existing diesel engine manufacturing industry, the setting up of cold storage plants, the renewal and establishment of ginneries, oil expellers and rice huskers. (Para. 67)

V. The Work of the Field Wing

57. A survey of the problems and potentialities of a Project Area should be made before a project is started. The first task will be the popularisation of "five firsts". The next step will be to induce proper use of water. Thereafter, new varieties will be introduced and the use of balanced fertilizers popularised. Attempts will be made to do away with fallows and to introduce double, and in some cases triple, cropping. The cultivation of legumes as fodder and soil improvers would be extended. The development of animal husbandry on the basis of more suitable feed including concentrates will be undertaken. Cattle will be reared not only for milk and ghee but also for beef and mutton. (Paras. 68 - 73)

58. Cooperative development will be carefully nursed and trained secretaries provided by the Corporations to give management assistance. Initially the societies will be credit and supply societies. Good existing credit societies will be persuaded to expand their activities in the distribution of supplies to members and to make a start in cooperative marketing of some major cash crops. Secondary societies, through the combination of primary societies, should be brought into existence to provide business and financial management. The bye-laws of the new societies

marketing organisation whenever it is set up. (Para. 84)

67. The project staff will devote attention to marketing of dairy products and the beef and mutton animals produced on the farm or on the range. Poultry production in the form of eggs or table birds will be encouraged. Wool shearing facilities and instruction in the correct flaying of hides and skins will be given. Farm fisheries will be improved and developed. Shelter belts will be planted. A larger production of vegetables and fruits will be encouraged. Attention will be paid to improvement or creation of fuel and timber reserves. Finally, there should be greater emphasis on savings out of the new higher income s for further investments. (Para. 85)

68. In the project areas the field work for salinity combat will be a major operation. With increased supply of water, continuous cropping should make it possible to eliminate the fallow and to increase production on a very large scale. A fairly rigid system of cropping and irrigation will be maintained until injurious salts have been leached away. (Para. 86)

69. The digging of field channels, the development of an agreed system of turns in the use of water, the levelling of fields, and the consolidation and re-arrangement of holdings are the necessary pre-requisites to the introduction of irrigation in East Pakistan. Suitable cropping patterns and rotations must be developed through experimentation. In the haor area the maintenance of power pumps should be reorganised and the cost of operations reduced. The development of a polder area, like the one under development in Khulna district, would necessitate initial flushing of fields before improved cropping systems can be introduced. (Para. 87)

70. In new areas, like the G.M. Barrage, the danger of salinity is acute and extensive drainage systems will be necessary. The task of a project in such an area will be to plan and provide proper irrigation channels and to give assistance in land levelling, the cost being recovered

from the farmer over a long period. The introduction of "five firsts" will follow with proper crop rotations and diversification. Mixed farming will be a part of this diversification. Cooperative farming in such areas on the pattern of the cooperative societies of Multan area should be started. Land should be allocated in such a way that the introduction of block farming would be possible. Cooperative marketing through cooperative societies should be attempted. The marketing of certain crops should be made through the processing industry organised by the project staff as has been done in the Gezira Scheme, or through cooperatives. Credit could then be li o marketing. (Para. 88)

71. The G.M. Barrage area should form a project of the Corporation. Project staff may have to assume complete responsibility for the project unless the non-agricultural measures can be suitably undertaken otherwise. (Para. 89)

72. Special steps should be taken in areas of high population pressure to increase incomes, particularly in Tippera and Noakhali in East Pakistan, and Sialkot in West Pakistan, especially through exploitation of water and combining of farms. (Para. 90)

73. It is necessary to run special projects separately in the mountain and desert range areas to evolve techniques through which existing methods of livestock production may be improved. Private enterprise should be encouraged to enter the field of modern ranching on a large scale. (Para. 92)

74. A project in the Quetta area would not only permit the development of a potato seed programme, but also assist the fruit industry. The project organisation will help to eliminate pests and diseases, introduce improved varieties, establish grading and better marketing. A fruit processing industry should also be established. (Para. 94)

75. In East Pakistan, the Chittagong Hill Tracts should be developed on a concerted plan. (Para. 96)

76. Initially, a few projects should be selected and as more workers

are trained, new projects should be taken up. A tentative list of projects which should be taken up early is given in para. 97.

Chapter 8 - Servicing the Farmers in Other Areas

Crash programme recommended in the Interim Report should open in January starting with the removing of cotton sticks and rice stubbles and proceed on lines suggested in that report. In East Pakistan it should now cover both aus and aman crops. (Paras. 2 - 3)

2. Special annual campaigns should be undertaken to eradicate pohli in West Pakistan and water hyacinth in East Pakistan. (Para. 4)

3. The Agricultural Extension Service should be reorganised and its personnel, size and facilities should be expanded. (Para. 5)

4. Agricultural extension should be limited to the following fields: (a) popularisation of good seeds; (b) popularisation of chemical fertilizers and farmyard and other manures; (c) widespread use of plant protection measures; (d) crop sanitation measures; (e) adoption of selected cultural practices; (f) increasing acreage under fruits, potatoes and other vegetables, expansion of high income crops like groundnuts and distribution of such plants as castor in West Pakistan and kapok in East Pakistan; (g) extension of minor irrigation works in East Pakistan; and (h) use of tubewells and percolation wells. (Para. 6)

5. An extension manual should be prepared giving simple but fairly detailed information on these subjects. (Para. 16)

6. To provide easy credit facilities, taccavi and agricultural loans should be made in kind from a union depot on the authorisation of a member of the Union Council. Long term credit for installation of tube-wells and planting of orchards should be provided by the agricultural credit institutions to individuals or cooperative societies. Small farmers would also obtain credit through their own cooperatives. (Paras. 17 - 19)

7. A matriculate with suitable training should be posted in each union. The pay scale of these Union Agricultural Assistants should be the same as that of a Village Worker in the Village-AID. These Assistants

should be provided with a bicycle, an office and a house allowance. (Para. 20)

8. The unit of operation should be the district. The District Agricultural Officer should be an experienced graduate. His status should be of a junior class I officer of the Central Government. He should be under the head of the district for actual work in the field and administratively under the head of the department. He should be assisted by an officer to be called Assistant District Agricultural Officer. A trained Plant Protection Officer should also be attached to him. Both officers should have the salary and the status of a class II Gazetted Officer. The District Agricultural Officer should have the power to remove inadequate Union Agricultural Assistants, subject to review by higher officers. Suitable transport should be provided to him and his two Assistants. (Para. 21)

9. Between the district and the union, there should be a Sector Agricultural Officer incharge of 10 to 15 unions to supervise the work of the Union Assistants. His pay scale should be Rs.200 -500. He should be provided with an office and housing facilities and a horse or a motor cycle or bicycle. (Para. 22)

10. There should be a Deputy Director of Agriculture at the divisional level, with a pay scale of a senior class I officer of the Central Government. The Director of Agriculture should be assisted by a suitable number of Deputy Directors. The largest possible delegation of powers should be made to the District Agricultural Officers. (Paras. 23 - 25)

11. The pay scales of the staff in the Departments of Animal Husbandry, Cooperative Societies and Fisheries should be brought to the same level as suggested for the Agricultural Extension Service. (Para. 27)

12. Land consolidation will remain the responsibility of the Revenue Department. The basic democracies will enlist the cooperation of farmers and have a consultative voice in any decision involving compulsion. Consolidation should be encouraged through the formation of cooperative societies. The Agricultural Development Corporations should be consulted on land

consolidation proposals. (Para. 29)

13. The Village-AID should confine its work to community development, awakening interest in development matters, giving assistance in public health and communications and to publicity and propaganda for improvement schemes. There should be close cooperation between Village AID and the Department of Agriculture. (Para. 30)

14. The Department of Irrigation should become entirely a hydro-engineering service, responsible for providing sufficient water at the canal outlet points. (Para. 31)

15. The Animal Husbandry Department should confine itself to veterinary work. The Corporations will take over livestock farms and supply improved bulls and semen to all areas and artificial insemination centres in non-project areas through the department. The manufacture of biologicals should be the responsibility of these departments. The Centre should undertake the setting up of standards for all products and organise an inspection service for the observance of standards. (Para. 32)

16. The amalgamated Agricultural Development Finance Corporation and the Agricultural Bank should issue loans to the larger farmers and loans on land security to all farmers. Small farmers will be assisted through cooperative societies or cooperative banks. (Para. 34)

17. The work of surveys, development and leasing of all inland fisheries should be given to the provincial Departments of Fisheries. (Para. 35)

18. The procurement and distribution of pesticides and plant protection equipment will be taken over by the Corporations. The field work will be done by the Corporations in project areas and by the extension service in other areas. (Para. 37)

19. In non project areas the Public Works and Electricity Department should remain responsible for building programmes. Higher priority should be given to agriculture in the distribution of electricity and unnecessary delays in the connecting up of power to tubewells or other wells should be eliminated. (Para. 38)

Chapter 9 - Research, Education and Training

Central Responsibility and Support to Agricultural Research

1. Agricultural research should be planned and coordinated on a national basis so as to meet effectively the national need for increased production. The Ministry of Food & Agriculture must assume direct responsibility for this work. (Para. 4)

2. The Central Government should provide for research a sum of between Rs. 10 and 20 million annually in addition to the capital cost of new institutes. This grant should not be related to cesses, and should not lapse at the end of the financial year. (Para. 5)

3. A Research Division in the Central Ministry. A separate Research Division should be created in the Ministry of Food & Agriculture which would also be responsible for agricultural economic studies and it should be headed by a Joint/Additional Secretary, who should be an agricultural scientist or an agricultural economist of standing and repute. When the work increases it may be advisable to provide a separate Division for Agricultural Economics and Marketing in which case the Research Division should be headed by a scientist and the Economics Division by an economist. (Paras 6 - 7)

4. A Research Council of Pakistan should be set up on the lines of the present Food & Agriculture Council of Pakistan, suitably reorganised and expanded. The Joint/Additional Secretary incharge of the Division would be the Chairman of this Council and its chief executive. He would draw in consultation with the provincial governments a programme of research on the basis of which allocations would be made to the provinces. The funds allocated to the Division would be divided into two parts, one going to the provincial organisations and the other to the Council. The funds allocated to the provinces will be administered by the provincial organisations and those allocated to the Council by that body which should function as an autonomous unit under its own charter and not as a body registered under the Societies Act. The Council will be

responsible for all long term research of national importance while provincial organisations will handle research problems focussing attention on the immediate need to increase agricultural production. The Council will also handle those subjects which have an international or inter-provincial character or are concerned with matters which provincial governments cannot adequately deal with and subjects which cover the fields of more than one department. The research organisations of the provincial agricultural departments should have a regular cadre of research workers. An Additional Director responsible for administration, execution and coordination of research, will work as Head of the Research Department and be responsible to the Director of Agriculture only for coordinating research with extension. (Paras. 8 - 9)

5. Pay Scales of Research Staff. The Commission recommends a cadre of research officers with the following pay scales:

1. Research Assistants	Rs. 225-500
2. Research Officers, equivalent to class II gazetted officers of the Central Government	Rs. 250-750
3. Assistant Research Specialists, equivalent to junior class I officers of the Central Government	Rs. 350-850
4. Research Specialists (Botanists, Chemists, Entomologists, etc.) equivalent to senior class I officers of the Central Government	Rs. 600-1,150
5. Principal Research Specialists or Heads of Divisions	Rs. 1,000-1,500
6. Heads of Research Institutes	Rs. 2,000
7. Additional Directors of Research	Rs. 2,500

Research workers of proven ability should be allowed to remain in service beyond the normal age of retirement. Research work of special merits should be suitably recognised. (Para. 10)

6. Provincial Research Organisations. There should be three research institutes in West Pakistan and two in East Pakistan. Each institute should be in the charge of an Institute Director. Additional Directors of Agricultural Research at headquarters would be in general

administrative control of these institutes and would maintain liaison with the Central and other governmental institutes and would also coordinate the work of the research institutes under his control. The Institute Directors would be responsible for the administration of research programme s within their jurisdictions. Each research institute should have adequate facilities in the form of land, buildings, equipment, libraries, sub-stations, etc. Each institute should have a separate budget to be operated upon by the Institute Director with adequate delegation of powers. The following Divisions are proposed for each institute: (1) Botany and Plant Physiology, (2) Soil Science including Agricultural Chemistry, (3) Entomology and Plant Pathology, (4) Agronomy, Irrigation and Farm Management, (5) Horticulture, (6) Animal Husbandry and Dairy Farming, and (7) Agricultural Engineering.

The results of research should be regularly reported and research programme should be drawn up for a number of years. Research extension liaison committees consisting of research workers, extension workers and farmers should be formed at Council level, Directorate level, Institute level and Sub-Station level. These committees should initially approve the programme of research at various levels, periodically review and assess the results and ensure that they are made available for speedy expansion to the farmers. (Paras. 11 - 13)

7. Other departments (such as Irrigation, Veterinary Services, Fisheries and Forestry) in the provinces should maintain similar research institutes on a smaller scale. An officer of suitable rank in each department should be placed in charge of research. Their programmes should be financed by the Central Ministry of Food & Agriculture on a continuing basis. (Para. 14)

8. The Corporations should be closely linked with the research organisation for all their research needs and they should undertake field trials in their areas as part of the programmes of research organisations. (Para 15

9. Where special institutes have been set up or are being used for the purpose of undertaking research, under the auspices of international

organisations like CENTO, they should be placed directly under the Research Division. (Para. 16)

10. Research experts should be seconded to the Corporations from the existing research organisations. (Para. 17)

11. Agricultural Research Council. The Agricultural Research Council should consist primarily of scientists and research workers. The Council will also advise the Joint/Additional Secretary on the research programmes to be undertaken by the provinces. (Para. 18)

12. Separate bodies and institutes for commodity research, such as Pakistan Central Cotton Committee and the Pakistan Central Jute Committee, should cease to exist as separate entities and be amalgamated with the Agricultural Research Council. The interests of jute and cotton should be specially looked after by technical committees of the Council. The technological facilities required for testing of fibres, research in cotton textiles, treatment of fabrics, and new and extended uses of jute may be handled by the Council of Scientific and Industrial Research. The Tea Research Institute at Sylhet should be brought under the Council. There should also be an Institute of Marine Fisheries Research which may be set up by the Council. (Para. 19)

13. The work of the Council would be divided into two parts, namely, research and economic research. Scientific research would cover researches on land, crops and livestock as well as the technological testing of the qualities of any new agricultural or livestock products. The economics section would coordinate the collection of statistics, make studies of prices and incentives and undertake market surveys. A Board of Economic Enquiry should be established in East Pakistan and the existing ones in West Pakistan should be strengthened. A separate section of the Council should be put in-charge of evaluating and publishing the results of all research undertaken by the Council. In this section, the Ministry of Food & Agriculture, the Provincial Research Organisations, the Provincial Extension Departments and the Agricultural Development

Corporations should be represented. A national register of trained Pakistani research workers in agriculture and allied fields should be maintained by the Council. (Paras 20 - 21)

Education

Expansion of higher agricultural education. To meet the great and immediate need of agricultural graduates, additional colleges should be set up at once and the existing ones expanded. Some of the existing arts colleges may be converted into agricultural colleges if land is available in the neighbourhood. (Para. 23)

Character of the Degree Course. This Commission is in general agreement with the Education Commission's recommendations regarding the entrance requirements, the duration of courses and the broad principles on which the courses are to be framed, except that shorter courses may be necessary in certain cases.

16. The establishment of the Agricultural Universities of which the Faculties of Agriculture and Veterinary Science will be constituent units, will necessitate a careful drawing up of the curriculum and syllabi. (Para. 25)

17. The system obtaining in West Pakistan, whereby each agricultural college has a Board of Governors, should be adopted for all such institutions till the Agricultural Universities take over. (Para. 27)

18. The Agricultural Universities should be granted full autonomy, adequately financed and their staff should enjoy the same pay and status as in other universities. (Para. 28)

19. Adequate emphasis must be given in the Agricultural Universities to the teaching of Social Sciences and the Humanities. All the existing colleges and the institutes in Agriculture, Animal Husbandry and other allied subjects should be affiliated to these universities. These universities may be located at Lyallpur in West Pakistan and in Mymensingh in East Pakistan. They should undertake such research as is necessary for the training of students, for the promotion of post

graduate studies and to enable the staff to keep up-to-date with scientific development. (Paras. 29 - 30)

115
20. Arrangements should be made between the universities and the research organisations to enable post graduate students, in pursuance of higher degrees, to work in the laboratories and in the farms of the research organisations. (Para. 31)

116
21. A committee should be appointed to work out practicable proposals for implementing the recommendations of the Education Commission regarding agricultural bias in school education. (Para. 32)

117
22. Consideration should be given to the organisation of a short course for farmers at district demonstration farms and in model villages. (Para. 33)

118
23. The Cooperative Department has a separate educational wing which arranges short courses for cooperative members at the district and tehsil headquarters from time to time. The Department of Agriculture and the Agricultural Development Corporations should plan courses on the lines of those organised by the Cooperative Department and, to make them attractive, the farmers might be paid a small allowance while attending them. (Para 33)

Training

119
24. The whole question of training the field staff should be reviewed and a comprehensive plan should be prepared. The training institutes should be properly staffed and equipped and have adequate land for practical work. (Para. 35)

120
25. To meet the need for a large number of well-trained practical men required in connection with the intensive work on the "five firsts" and on the long term methods of increasing production, training schools in large numbers should be started in the near future. (Para. 36)

121
26. Suitable men out of the Jute Regulation Staff in East Pakistan who are now employed in the lower ranks of the Agriculture Department, as well as the untrained lower staff in West Pakistan should be given a

training course of at least one year. The others should gradually be transferred to posts requiring less technical knowledge and skills. (Para. 37)

27. Much of the curriculum of the Village-AID institutes, particularly in mass contact and communication, can be usefully incorporated in the training of union level workers in agriculture. (Para. 38)

28. The existing cooperative training institutes should also give training in business management and farm management, in addition to accounts and cooperative theory. (Para. 39)

Chapter 10 - National Agricultural Policies

Taxation and Tenure

124 The land tax should assist development. Unused land should, therefore, be taxed and newly developed land should have tax concessions. There should be a fixed rate of tax per acre irrespective of whether the land is cropped or not, in accordance with the present agricultural values Rates should vary by zones and not by individual plots. Tax concessions should be given when small farmers combine into cooperative farms or a system of block farming. Installation of tubewells, power pumps and drainage systems should also result in tax concessions. (Paras. 4 - 13)

125 29. A betterment tax may be imposed to recover the cost of land improvement by government through such measures as provision of irrigation, flood protection or drainage. (Para. 14)

126 30. Export duties should be reviewed to ensure that they do not act as disincentives. Imposition of taxes directly on agricultural products should be avoided and additional revenue required should be obtained by raising the land revenue tax. (Para. 15)

127 31. Land tenure systems should be reviewed by West Pakistan Land Commission and by a similar Commission to be appointed in East Pakistan. The new systems should aim at guiding both landlord and tenant towards assistance in a production drive and permitting them to benefit to the extent of their contribution towards increased production. This

examination should include questions of security of tenure, the desirability of removing inefficient tenants and the need for increasing investments through direct cultivation. In East Pakistan further attention should be given to allow the raiyats to acquire ownership, to replace rent by land tax, and to give the bargadar the status of a tenant. (Paras. 16 - 18)

125. To reduce loss of time and money, basic democracies be used to deal with disputes about rents, tenant rights, rights of eviction, etc. Alternatively, arbitration teams may be set up to settle such disputes. (Para. 19)

There is need for ensuring proper use of undeveloped lands taken over under land reforms, for assisting landlords to produce more from their reduced estates, for providing assistance to new owners and for cooperative development. Good tenants on land not taken over who have not benefited by the reforms should be given prior consideration for settlement in new colonies. (Para. 20)

Problems of Irrigation

7. Surface drainage should get top priority. There should be no delay in examining and taking appropriate action on the programme of work prepared for this purpose by the West Pakistan Government. Evaluation of investigational work on the best method of draining soils and lowering the water table should be speeded up. (Paras. 22 - 23)

8. Control of cultivation, grazing and felling of forests should be undertaken in catchment areas and in the plains protective measures, such as afforestation of river banks, making of protective bunds, dredging of river courses and clearing of impeded drainage systems, should be undertaken on an increasing scale. Surveys are necessary in East Pakistan. (Paras. 24 - 25)

9. To control salinity, water must be applied in sufficient quantity to leach the salts out of the surface soil and carry them away in the drainage water down to the water table. Additional water for this purpose can be made available by three possible sources - flood water during

summer months, flood water stored in dams and reservoirs and under-ground water. Early steps should be taken to find suitable crops and cropping systems which can make the best use of flood water, and a start made on existing knowledge. A detailed study of the cost and practicability of increasing the capacity of present canal systems or of providing additional channels should be made. By constructing a new barrage between the present Sukkur and Ghulam Mohammed barrages, it may be possible to bring large additional areas in Sind under cultivation during the flood season. The dams planned at Mangla and Tarbela should be of a large capacity and consideration be given to the building of additional dams in other rivers and streams. Government should expand programmes of developing tubewells and individuals or cooperatives should be encouraged to install wells. (Paras. 26 - 23)

10. Full study should be made of the water economy of West Pakistan taking into account changes caused by the Indus Water Agreement for determining the best use of any additional supplies of water. In the meantime, there should be no new commitments of waters of Indus Basin beyond the present irrigated areas. A study should be made of the irrigation projects under construction and, in the light of present information, a decision made as to whether they should be completed in accordance with existing plans or whether alterations should be made to provide for more intensive irrigation on more limited areas. Irrigation schemes should be pushed in East Pakistan for enabling intensive cropping. In all irrigation schemes, making of water channels, levelling of land and fixing of land use patterns should be carefully planned and supervised. (Paras. 30 - 32)

11. The Irrigation Department should only be responsible for delivery of water at the outlets; water should be charged for on a volumetric basis and each farmer should pay in accordance with his commanded acreage. Meters should be installed at outlets to ensure delivery of correct quantities of water. A committee should examine the question of

silting of channels and of lining of canals. Adequate funds be provided to carry out efficient maintenance of canals. (Paras. 33 - 35) //

Colonisation

35 12. Colonisation areas must be regarded as production projects and not merely as resettlement areas. Government should provide assistance for such vital matters as laying out of water channels, drainage systems or levelling of land. (Paras. 36 - 38)

Use of Labour

13. A national corps for development work should be created and provision made by law for compulsory service. All men, not gainfully employed and within certain age limits, should be required to serve for a period of time in a labour corps which should be organised in the form of a semi-military body. All able-bodied men between the ages of 20 and 45 years, should be registered. (Paras. 39 - 44)

Food Policies

14. The Commission repeat the recommendation regarding the establishment of a Food Price Stabilisation Board. (Para. 47)

15. Modified rationing in East Pakistan should be replaced by a system of releasing reserves wherever prices tend to rise abnormally and of buying in the local markets when prices fall to a floor level. (Para. 48)

16. The superior quality Punjab rice, especially Basmati and Begmi, are now treated as export crops, and their movement is banned except for export through Karachi. A thorough re-examination of the whole policy regarding the marketing of this rice should be made. The possibility of reducing the present high price to encourage larger export should be considered and as the output of superior rice increases its movement may be liberalised for internal consumption through normal trade channels. (Paras 49 - 50)

17. Measures suggested for increasing production are likely to make earliest impact on rice yields. While in East Pakistan increase

will be off-set by population growth and diversification of crops, larger production will come in West. Quality control, exploration of new markets in Europe and America for raw or cooked rice and expansion of Basmati and Begmi are necessary to enable larger exports. (Paras. 51 - 52)

18. Rise in wheat production is not likely to be rapid in irrigated areas. More attention is needed in barani lands and on coarser food-grains especially hybrid maize, hybrid sorghum and barley. (Para. 53)

Cash and Export Crops

19. An active policy should be pursued to carry out research into methods of producing and marketing of jute, finding new markets and new usages for its superior and lower grades. Grading should be introduced early. (Paras. 54 - 56)

20. The intensification of effort, as envisaged in this report, should enable the production target of 2.25 million bales of cotton being surpassed by 1965. The existing programmes for expansion failed owing to insufficient water, poor and uneven cover of plant through lack of line sowing, inadequate plant protection, unreliable seed and salinity. These difficulties must be overcome. Proper ginning is essential. The provision of financial assistance to gin owners for the purchase of up-to-date machinery and for training is necessary. Government regulations for the operation of ginneries need to be enforced. Increased effort are necessary for publicity in the export market for American cotton grown in Pakistan. The present trade practice of pegging the price of raw cotton to the price of lint in the Karachi market should be reviewed as it takes no account of the rise in the value of cotton seed. Early action should be taken on the scheme for the grading of cotton. (Paras. 57 - 61)

21. Steps should be taken to expand the tea industry in additional areas. (Para. 62)

22. Efforts should be made in East Pakistan to expand the

cultivation of mustard. (Para. 64)

23. To encourage a government grading service of fruits, facilities for raw materials for canning, foreign exchange and credit should be provided. Sugar used for preserving purposes should be free of excise duty. The possibilities of encouraging people to allow coconut to ripen should be examined. The question of providing processing machinery for Mekran dates should be attended to early. Such plants may also be set up in other areas like Khairpur and Muzaffargarh. The organisation of producers' cooperatives for vegetable and fruit growers should be given early consideration.(Paras. 65 - 67)

24. Attention should be paid to the expansion of the production of castor seed , kapok and guara. (Para. 68)

Animal Husbandry

25. Mixed farming with the better care of animals can be gradually extended in the cultivated areas. In the range areas, action should be taken for strict control and management of grazing, provision of more watering points and the use of a larger part of the irrigation water for the growing of livestock feeds to tide them over times of scarcity. The setting up of an industry for making concentrated feeds from by-products, such as mollasses from sugar factories and cake from oil factories, should be given encouragement. (Paras. 70 - 73)

Breeds and Breeding

26. Herds of outstanding breeds of cattle should be kept pure and the formation of breed societies with their own herd-books to ensure that standards are maintained should be encouraged. The introduction of foreign breeds should be made only on an experimental basis and kept under strict control. Introduction of Jersey breed for dairy development is, however, indicated. The results of introductions made in the past, particularly on the military farms, should be carefully analysed by an expert animal geneticist. Breeding policies in future should aim at producing milk and beef animals. Facilities available at the insemination

centres should be considerably improved. (Paras. 75 - 78)

27. When there is a large increase in the supply of milk, farmers should be organised into milk cooperatives, their milk collected and taken for treatment to a central plant, and then sold in large consuming centres. Meantime the setting up of organised and supervised milk colonies on the outskirts of the large cities is a step in the right direction. (Para. 79)

28. Foreign breeds of sheep have been introduced to improve the fineness of wool for cloth making with very good results in the case of the Rambuillets from U.S.A. An expert geneticist should be employed to analyse the results of this work and also the work done on selective breeding for both fine and carpet wool. The Commission is not in agreement with the policy of eliminating the goat from all areas although free ranging goats should not be allowed in forest and heavily cultivated lands. In the range and hill catchment areas, they are the most economic animal to keep. (Paras. 80 - 81)

29. The provision of effective disease control measures and supply of balanced foods at economic prices are the greatest needs for the development of the poultry industry. Assistance should be given to encourage broiler industry. The potentials of local breeds both for egg laying and as table birds should be further investigated. (Paras. 82 - 84)

30. There is need for the drawing up of an overall plan for the control of all common diseases. Such a plan might be looked upon as a 'crash programme' in animal health and be approved for a period of some years. Powers should be given under law for the veterinary service to undertake compulsory inoculation of animals as a protection. (Para. 85)

Marketing

31. The system of regulated markets prevailing in the Punjab should be introduced throughout the country. In East Pakistan auctioning by government of market rights to the highest bidder should be discontinued. (Para. 87)

32. The Directorate of Agricultural Economics at the Centre, with the help of provincial organisation, should organise a strong market information service and disseminate information on crop supplies and prices on a provincewise basis. (Para. 88)

33 Basic requirements in the regulated markets are fixed marketing charges, standard weights and measures and a body to settle disputes. (Para. 89)

34. A simple system of warehousing whereby farmers could deposit their surplus crops against a cash advance should be started in the project areas. (Para 91)

35. Provision of cold storage is necessary where perishable goods are being produced on a large scale, such as fruits and vegetables, meat, poultry and fish. Facilities could be supplied by private enterprise, which should be given government backing for suitable schemes. If this is not forthcoming, the Corporations should take direct action in the matter. (Para. 92)

36. Consideration should be given to the posting of Trade and Agricultural Attaches to Embassies abroad so that they could inform the foreign countries of details of produce available in Pakistan and inform Pakistan of possible markets abroad, and of the type and quality of produce wanted. Such an export drive would have to be linked with the setting up of standards and of grades which would be acceptable in the world markets. (Paras. 93 - 94)

Credit

37. Supervision of credit is essential. The credit institutions may also advance loans in project areas on the recommendation of the project staff to enable supervision. Under certain circumstances non-development loans are necessary, e.g. when a farmer falls ill or is involved in litigation. Credit should be available for such expenses through cooperative societies. In the case of widespread emergencies, taccavi is still the most suitable method of assistance. (Paras. 97 - 100)