

# **Pakistan Agriculture**

## **A Description of Pakistan's Agricultural Economy**

**Akhtar Mahmood and Forrest Walters**

### **Contributors**

Mubarik Ali  
Mohammad Anjum  
Aslam Chaudhry  
Kamil Lodhi  
Agha Abbas Raza

Published by the Directorate of Agricultural Policy and Chemonics International Consulting Division for the EAN/Economic Analysis Network Project in collaboration with the Ministry of Food, Agriculture and Cooperatives, Government of Pakistan, and United States Agency for International Development under the provision of USAID Contract 394-0491-C-00-5034.

Dr. Forrest Walters is the Chief of Party, EAN/Chemonics and Akhtar Mahmood is the Senior EAN Advisor. Contributing Authors are EAN economists.

**Editor/Design:** Amera Khan

**Production:** Kamran Rafi

Islamabad, Pakistan

May 1990

# Pakistan Agriculture

## Contents

### 1 The Agricultural Economy

- Introduction 3
- Its Condition 3
- Food Consumption Patterns 11

### 2 GOP Agricultural Development Strategy

- Introduction 15
- Goals and Priorities 16
- Objectives 18

### 3 The Macroeconomic Setting 25

### 4 The Food and Fiber System

- Introduction 37
- Farm Inputs 37
- Agriculture and Farming Systems: An Overview 38
- Manufacturing 96
- Food and Fiber Storage, Transportation and Communication 100
- Wholesaling and Retailing 101

### 5 Input/Output Analysis of Pakistan

- Food and Fiber System 105
- Contribution to Value Added 107
- Contribution to Employment 107
- Contribution to Exports 109
- Contribution to Imports 109
- Energy Consumption 111
- Output Multipliers 112

### 6 Food Consumption Pattern 115

**7 Functioning of the Food and Fiber System in Pakistan**

Government Functions 121

Private Sector Functions 125

Major Areas of Development Potential 128

**8 Measuring and Monitoring Changes in the Food and Fiber System**

Introduction 133

Farm and Forest Production 133

Farm and Forest Input Use 139

Farm and Forest Productivity 140

Agricultural Business Production 142

**References 147**

**Appendix 156**

# Acknowledgements

This report was requested by the Agriculture and Rural Development Office, US Agency for International Development (AID) and the Director General of the Economic Wing (EW) of the Ministry of Food Agriculture and Cooperatives. The Agriculture and Rural Development Office of US AID is using the report as background for developing donor agricultural strategy. The Director General is using the report to develop ongoing functions for the Economic Wing. We appreciate the support of Dr. A. Hamid Maan, Director General of the Economic Wing of MINFAC, Dr. Pat Peterson, Chief of the Agriculture and Rural Development, Dr. Tom Olson, Chief of the Economic, Marketing and Policy Analysis Division and Dr. Zakir Hussain Rana, Project Officer, Economic Analysis Network Project, US AID.

The presentation of this report is entirely the work of the Economic Analysis Network Project editor, Ms. Amara Khan. The fact that it is in print is due to the publications officer, Mr. Kamran Rafi who produced the camera ready text.

This report was prepared by the Economic Analysis Network Project with the support of all its' staff members. Dr. Mubarak Ali contributed the materials relating to input-output analysis. Dr. Aslam Chaudhry and Mr. Agha Abbas Raza participated in the description and analysis of the agricultural resource base. Dr. Muhammed Anjum worked on the section on functioning of the food and fiber system and Mr. Kamil Lodhi contributed to the sections related to marketing. The senior authors take responsibility and apologize for errors in fact and implication that will inevitable occur in a report that covers the broad subject of agriculture in Pakistan.

# Preface

This Special Report is developed to depict the Pakistan Agricultural Economy and its role in overall economic development. It is written for the reader interested in an in-depth description of the Pakistan Agricultural Economy and related policy issues. It is also for the reader concerned with the whole of the agricultural economy as well as major sectors. This Special Report is developed from a series of studies and inquiries by the staff economists in the Economic Analysis Network (EAN) Project.

An economic picture, over time, is shown for farming and agriculture business by indexing production, input use and productivity. Through this perspective the reader can see the basis for growth in both farm production and agricultural business services. In addition, a more detailed description of sector growth and structure of the agriculture economy is observed through a comparison of the input/output analysis in 1975-76 and 1984-85.

The newly formed Economic Wing will use techniques shown in the report for tracking and reporting development progress of the agricultural economy. The indexes of production, input use and productivity can be updated from year to year based on common annual information. In addition, commodity sector progress will be traced and depicted by the Economic Wing through a yearly Chart Book.

This Special Report follows from several commodity sector, irrigation, and food and fiber system studies published earlier. The commodity sector reports are EAN Special Report No.1, *The Pakistan Poultry Industry: A Policy Analysis Framework*, EAN Special Report No. 8, *The Pakistan Sugar Industry: An Economic and Policy Analysis*, and EAN Special Report No. 14, *Pakistan's Dairy Industry: Issues and Policy Alternatives*. The irrigation studies included, EAN Special Report No. 9, *Rationalization of Irrigation Water Charges in Pakistan: Answers to Some Policy Questions*, and EAN Special Report No. 10, *Economics of Past and Prospective O & M Investments in the Canal Irrigation System in Pakistan's Punjab*. Finally, a comprehensive study of the food and fiber system, EAN Special Report No. 12, *Contributions and Interlinkages of the Food and Fiber System in Pakistan's Economy* is used.



# 1 The Agricultural Economy

## **Introduction**

The agricultural economy plays an important role in the economic development of Pakistan. It supports a growing food demand, economic growth and the development of other industries and services. The growing agricultural economy provides products and production for domestic and exports markets. As the agricultural economy becomes more productive and satiates the growing food market, a smaller portion of consumers income is required for the necessities of food and fiber and the remaining larger portion of consumer income is available for consumption and investment in the rest of the economy. Added agricultural products and production, beyond the domestic market, further supports income and foreign exchange earnings. Also, through improved farm productivity, labor locked in farming can be released for the expanding agricultural business and other industries. In short the agricultural economy and the "rest of the economy" are mutually dependant with the agricultural economy providing resources to the "rest of the economy" as both sectors continue to grow. However, at the same time the agricultural economy makes up a declining portion of the total economy as smaller portions of the consumer budget are required for food and fiber.

The Pakistan economy, to a large extent, can be characterized as an agricultural based economy. A major part of the economy depends on farming the collection, storage, processing and distribution of agricultural commodities and wages paid by farming and agricultural business to the household. More

specifically, the well being of the economy depends importantly on the production, processing, and distribution of major crops such as cotton, wheat, milk, meat, sugar and edible oils. In the longer run the agricultural economy is producing an increasing marketable surplus that is supporting sustained economic growth and the transition to a more market oriented economy.

The agricultural economy, (farming and agricultural business) is the dominant force, dragging or driving the growth and development of the national economy. Based on a recently updated input/output analysis, roughly one half of the gross domestic product is produced by farming and agricultural business. The agricultural economy accounts for over half of household consumption, two thirds of employment and three fourths of exports. No other sector is larger or more intimately related to the individual and the everyday consumption of necessities. Also, the agricultural economy uses nearly half of all imports and energy consumed, as well as, one third of all investment.

Overall, the agricultural economy has an important impact on total business activity or total output of the economy. A one rupee increase in farming and agricultural business production will stimulate a 2 rupee increase in overall business activity. The chain reaction of purchases of inputs from all sectors of the economy and the input sector's purchases of inputs results in the single rupee turning over two times in the economy. The rest of the economy in general has a somewhat smaller multiplier or chain effect. In the chain of purchases the agricultural economy purchases about 85% of its' purchases internally and about 15% of its' purchases from the rest of the economy.

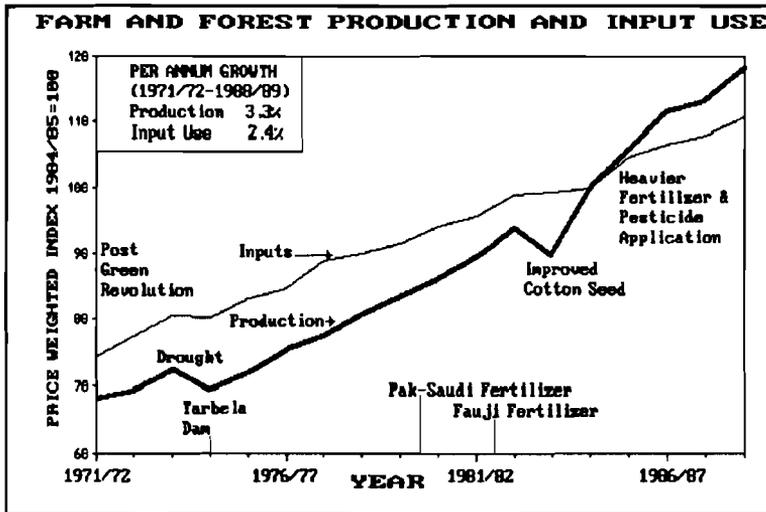
## **Its Condition**

The agricultural economy is considered here, more broadly, as farming and agricultural business. **Farming** is Pakistan's largest private sector which produces food and fiber crops and forest products. **Agricultural business** includes the collection, storage, manufacture and distribution of farm and forest products and inputs. The total of agricultural business and farming industries and their coordinated activities are often called the food and fiber system.

Farming

Farm and forest production has been growing, since 1971-72 at about 3.3% per annum. Most of the growth, roughly 2.4% points per annum is due to these of additional inputs. The remaining farm and forest production growth, .9% points per annum, is due to the more efficient use of inputs so that more production is obtained for each unit of input used. More recently, since 1983/84 farm and forest production has been growing at 5.7% per annum with 2.2% points per annum due to additional inputs used, and 3.5% points per annum due to productivity growth (more production for each unit of input used). This, to some extent, demonstrates the increasingly important role that research and extension play in support of growth in farmand forest production since a large part of agricultural research is directed towards increasing the productivity of inputs used.

Figure 1



The farm and forest production index, shown in the nearby figure, consists of the production of food grains, pulses, vegetables, meat and fish, milk, edible oils, sweeteners, cotton, eggs, timber and firewood, weighted by 1984/85 product prices. The farm and forest input index is made up of the major inputs used by the farm and forest sector including farm labor, irrigation water, fertilizers, pesticides, improved seeds, tube wells, tractors, credit disbursed, crop acreage and forest acreage. The increased growth in farm and forest production is largely due to improved cotton production, vegetables, meat and fish, edible oils and timber. Growth in farm and forest production was limited by stagnating food grains and sweetener crop production requiring chronic long-term imports of wheat and sugar. In addition, pulses and firewood production declined. Stagnating growth in food grains and sweetener crops is associated with slow growth in the use of irrigation water, land, fertilizer and improved seeds. Currently, water available for the coming 1990 wheat crop is reduced, fall fertilizer usage appeared to decline and acreage planted is forecast down by 2%-5% compared to last years 1989 crop.

### **Reduced Availability of Farm and Forest Inputs**

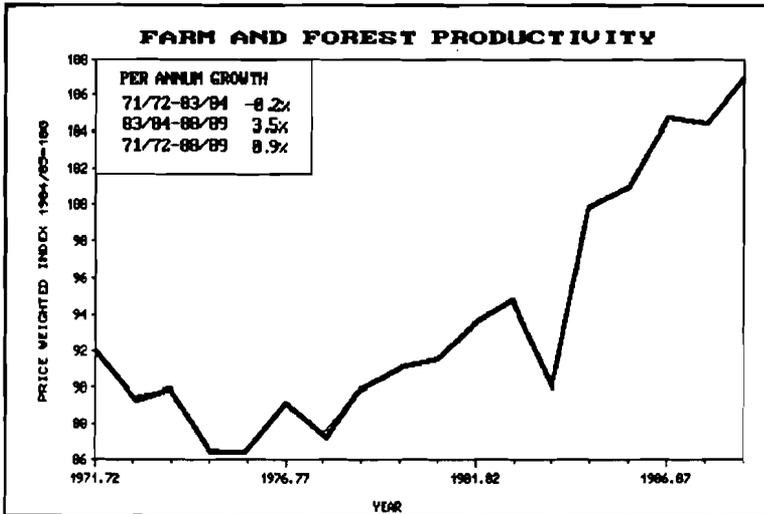
Farm and forest inputs used have, since 1983/84, "leveled off" due to declining growth in the availability of natural resource inputs (irrigation water and cultivated land). Limits to growth in this area could be reduced by solving the river water apportionment problem, building additional storage capacity and repairing and maintaining the existing canals and water courses.

The availability of other inputs as fertilizer and improved seeds could be improved through the construction of additional fertilizer production capacity so that there is less dependence on imports and limited local transportation facilities. Improved wheat seeds are almost wholly dependant on national corporation production. Private production of improved wheat seeds from new genetic material is insignificant.

### **Farm and Forest Productivity**

Farm and forest productivity has, since 1983/84 been growing much faster than in the past. This improvement is largely due to the recent increases in cotton, vegetables and meat production. Other farm and forest production sectors are growing at near or less than the rates of population growth. Continued productivity growth is particularly important because without it

Figure 2



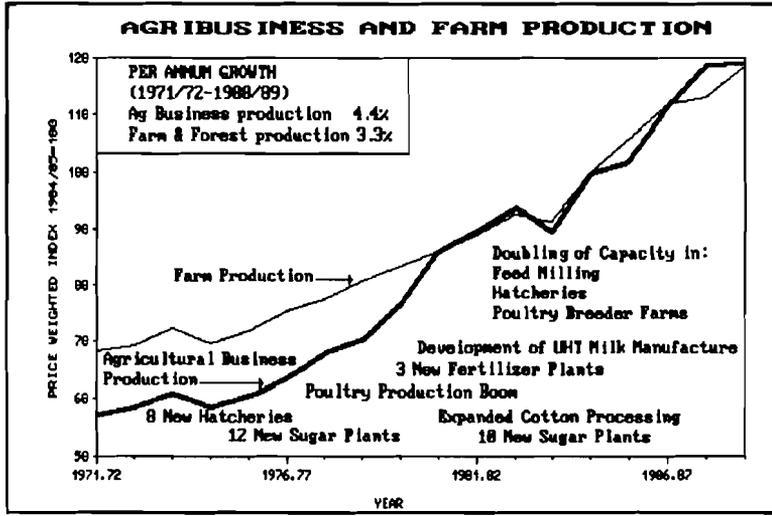
growth in farm and forest production would be at levels below population growth rates. Such slow growth would result in absolute declines in the per capita availability of food.

### Condition of Agricultural Business

The Index of Agricultural Business Production is made up of selected production in the agricultural economy and weighted by the gross price margin. For example seed cotton ginned is weighted by the gross price margin or the difference between the value of lint and cotton seed from a ton of seed cotton purchased for ginning. Ginning is a service and the price of the service per ton of seed cotton ginned is the gross price margin. Selected production sectors in the index include food manufacture, tobacco manufacture, fiber processing and textile manufacture, farm input manufacture and credit disbursement and forest products.

The Agricultural Business Production Index varies significantly from year to year but the trend is generally positive. The upward trend has been supported

Figure 3



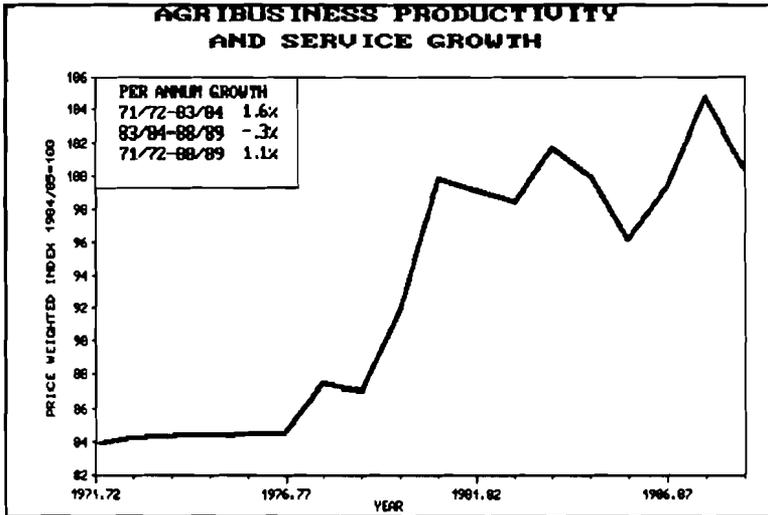
by animal slaughter, vegetable processing, beverage production, cotton ginning and yarn production, jute textile production, fertilizer production, tractor assembly and credit disbursed. The index expansion is held down by negative growth in the production of firewood, tube wells, and woolen fabrics.

### Constrained Agricultural Business Growth

During the decade of the 80's agricultural business growth as shown by the nearby chart was constrained to the growth level of farm and forest production. On the whole, agricultural business continued to process, distribute, wholesale and retail the farm product at about the same levels. For the most part, there were no significant net new services added to the agricultural business sector. Further, "marketization" of the agricultural economy is necessary to encourage further development of agricultural business growth.

Marketization of the agricultural economy involves the development of services and a market economy. Currently, the Government of Pakistan is

Figure 4



"making up it's corporate mind" on the level of public sector involvement that is needed in the agricultural economy. This involves allowing important commodity prices to rise or fall to market levels and withdrawing public services involved in commodity processing and distribution. It is generally thought that the rising private sector will provide more services. As the private sector rises the question of the need for regulations and enforcement of regulations on competition, fair trade practices and collusion is becoming more important.

More specifically, growth of agricultural business depends on modification of government policies affecting sectors such as the sugar, milk, poultry, edible oils and fertilizer industries. Example issues are discussed below.

In the sugar industry the need for self sufficiency is under question. Sugar cane production displaces valuable wheat, cotton and rice. A number of foreign exchange implications follow because wheat is chronically imported, cotton is Pakistan's major export, edible oil, a major product from cottonseed, is a major import and rice is one of the more profitable exports.

In the milk industry there is a need to annually take inventory of livestock numbers and production. Nearly 30% of the diet, by weight, is made up of milk and selective policy actions need to be taken, from time to time, depending on the position of production in the cycle. At this point estimates of livestock numbers are not accurate enough to show the swings of the ordinary livestock cycle.

In the poultry industry studies have shown that growth in the industry is dependent on reducing import restrictions on high protein feeds. Currently, the domestically available high protein feeds are often contaminated and of low quality causing both disease and reduced conversion ratio's. The poultry industry is an industry largely unhampered by government regulation. It has been growing at well over 10% per year for the last decade and is largely filling the gap between meat production and growing demand associated with climbing incomes.

In the edible oils industry prices are held down by heavy levels of importing. With higher prices in neighboring areas a large amount of the cheaper subsidized oil probably escapes into adjoining countries. The result is a costly program that could be corrected by allowing prices to rise to market levels without efforts to saturate the market with subsidized imported oil.

In the farm inputs businesses production and sales are being constrained by investment restrictions and price controls. Fertilizer prices are being held down by market domination from the public sector. In the seed business the introduction of new seeds and methods of producing seed are constrained by investment restrictions on foreign firms. The irrigation system is a supply driven system and farmers are unwilling to pay water charges necessary to maintain canals and water courses. A number of studies show that operation and maintenance expenditures have exceptionally high benefit costs.

Over all, the nationalized banking industry, aided by donors is supporting substantial misallocations of credit. For example, credit has been extended to build, over capacity in UHT milk plants, sugar processing, hatcheries, feed milling and tractor production. Credit and capacity are needed in fertilizer production, pesticide formulation plants, seed production, tractor and bullock pulled implements, tube wells and canal and water course repair and maintenance.

### **Agricultural Business Productivity and Service Growth**

As shown, by the nearby graph agricultural business productivity growth in services has declined recently. As discussed in the above section this is largely due to a number of constraints on agricultural business growth and will require policy modifications to achieve further growth.

Specific measures of productivity in agricultural business are usually specific to the industry, for example, in the sugar processing industry the recovery rate of available sugar in sugar cane is about 78% compared to the industry standard of 85%-92%. In the poultry industry the broiler production to feed ration is around 2.5 compared to the industry standard of around 1.9. In the dairy industry Ultra High Temperature treated milk has to be supplemented with dry powder milk to meet solid content standards. Other agricultural businesses as the fertilizer industry are undergoing "debottle necking" so that more throughput can be obtained and changing conversion systems so that natural gas is converted to ammonia gas with less energy expended. The textile industry is converting to power looms and machinery which uses short staple cotton. These measures are important indicators of gains in productivity for single industries but are not necessarily representative of all agricultural business.

In brief there are a number of policy issues related to the continued development of production and productivity in farming and agricultural business. The policies center around public allocation of funds for public benefits, restraints to investment and pricing policies that cause the inefficient allocation of resources. On the other hand, fair trade and competition regulations are, for the most part, not enforced.

### **Food Consumption Patterns**

Food consumption patterns in Pakistan are changing in line with increasing per capita incomes and urbanization. Currently, by weight, nearly three quarters of the diet is made up of cereal and milk products. About half of food expenditures are made on cereals and milk products. Based on the period from 1971-72 to 1984-85 food consumption has shifted to include higher levels of vegetable oil, meat, fruit and vegetables. The increase in vegetable oil is dramatic and thought to be associated with import and low price policies as well as growing per capita incomes. Sweetener consumption is also associated with growing per capita incomes but has remained relatively stable.

In the cooking oil group, vegetable oil and ghee has been replacing desi ghee, a home made cooking fat made from cream. Lower priced vegetable oils and the inconvenience of making ghee are apparently responsible for the reduced use of desi ghee. In the sweetener group refined sugar has been replacing gur a home made sweetener made from sugar cane. A rapidly expanding sugar refining capacity and the convenience of refined sugar are contributing factors to the decline in gur making and consumption.

As the food consumption pattern shifts towards more meat in the diet, the preferences among meats are more easily observed. Mutton is the preferred meat followed closely by chicken and fish. Beef, consisting of both buffalo and cow meat is last in the order of preferences. Prices also reflect the same pattern. Both chicken and mutton are used for ceremonial occasions as well as cuisine dining. On the other hand, beef is more common among poor families. For the poor, pulses are the more common food used to increase the quality of protein. The production of pulses has been declining rapidly during the last five years causing concern for protein intake among the poor.

As incomes are increasing the proportion of income spent on food is declining. Surveys from the early 1970's indicate that the average food expenditures were around 50%-55% of income. In the beginning of 1990 the percentage of income spent on food had dropped to around 45%. The decline in the proportion of income spent on food was relatively uniform among income groups.

In brief as incomes have risen since 1970-71 food consumption patterns have shifted proportionately from cereal and milk products to meats, vegetables, fruits, and vegetable oils. Even though more expensive foods were consumed the proportion of income spent on food has continued to decline steadily. This is consistent with the role of agriculture in economic development in providing relatively cheaper food so that a larger portion of income is available for investment and other forms of consumption.

Overall, since the early seventies, some gains have probably been made in food security. Food Security is a national goal and the end result of the vitality of the agricultural economy. Food security is the access that the entire population has to the amount and quality of food necessary for good health. Improvement in food security has been gained through growth of the agricultural economy at higher rates than population growth. Real gains in per capita food and fiber availability are occurring as well as some gains in quality of foods in the diet. This improvement is counter balanced by narrow based

exports in cotton and cotton products, an erratic market, and rice, a threatened market. Exports are necessary to generate foreign exchange for the growing dependence of Pakistan on imports of vegetable oils, wheat, sugar, fertilizer and fuel.

# ماتى لىك مەنى

ضم

نقبة

و

عظم

نەكىللىرىنى پەزىلەتلىرىنى تەستىقلىشىش، مەنىلەر

## 2

# **GOP Agricultural Development Strategy**

---

## **Introduction**

The focus of the Government of Pakistan on agriculture is due the greater central role it plays in economic development. The Pakistan economy is a transitional agricultural economy that is slowly but consistently developing a more complex food and fiber system and a larger industrial sector. For example, during 1984/85 the food and fiber system accounted for 49% of gross national product and farming itself accounted for half that amount. This is similar to an earlier 1975-76 period when the food and fiber system accounted for 48% of the gross national product, however, farming had a larger share accounting for two thirds of that percentage. Viewed from another perspective, nearly 70% of all employed labor is involved in the food and fiber system. Further, in relation to business development and expansion, a major part of national capital formation occurs within the food and fiber system. Important investments have been made in land and water development, cotton ginning and rice husking, sugar refining, fish hatcheries, commercial poultry production, ultra high temperature milk treatment plants and feed mixing.

In short, the food and fiber system is the driving force of the economy of Pakistan. Due to it's historic origin, as the basis of the economy, it is the source of labor for other industrial sectors, capital for new business, revenue

for the federal and provincial governments, and exports that balance the imports required by other developing sectors. It interacts with all other sectors using the resources of most other sectors and often provides the raw material for other sectors, as well as food and fiber for the households.

## **Goals and Priorities**

The goals of agricultural policy are developed in the 7th Five Year Plan 1988-93 and Perspective Plan 1988-2003 as part of the national goals:

"...to formulate specific, monitorable targets for increasing national self-reliance, supported by legislative safeguards, as necessary, especially in the areas of Government finance, food, defence, export-oriented manufactures, high technology products and energy;" and

"...to implement a concrete programme of poverty alleviation, especially in the rural areas, to attain full employment, and to ensure continued growth with stability;"

Currently, the Pakistan agricultural strategy is based on three priorities of (1) national food security, (2) full employment in the rural areas and (3) expanded foreign exchange earnings. These three priorities are part of the national plan to formulate specific monitorable targets for increasing national independence in the areas of government finance, food, defence, export oriented manufactures, high technology products and energy. Overall, the goal is to accelerate the rate of growth of the agricultural economy so as to generate larger resources for the public welfare. Among other things, this goal implies the improvement of food security by increasing food production consistent with rising incomes and a high population growth rate, by maximizing stability in food supplies and by ensuring adequate access to food to all groups of society.

Near or full self sufficiency in food has virtually always been a major priority, first, because import of wheat, edible oil, sugar and more recently of milk products is an unacceptable burden on the balance of payments of the country. Production of wheat has generally lagged behind the growth of demand and substantial amounts have had to be imported specially in the eighties to meet the deficits. The supplies of milk and milk equivalents which constitute almost one third of total food consumption have also had to be

augmented every year in the current decade though this has so far been due more to the existence of seasonal and/or specific local shortages than any overall deficits. The share of imported vegetable oils in total consumption has increased from 65% in 1980 to 78% in 1988 partly because consumption of vegetable ghee increased rapidly and partly because area under traditional oil seeds crops shifted to other crops, and yields increased only slowly. Growth of pulses which together with wheat are an indispensable source of proteins for the poor have suffered for lack of technological innovation and varietal improvement. Sugar cane, the base for a major import substitution product, has indeed developed though primarily by substituting for other crops. Secondly, the achievement of self sufficiency is now well within reach. Given the present yield gaps between progressive and average farmers, average farm productivity can be raised by at least 15 to 20% but only by improving agronomic practices and applying inputs at the proper time and in proper proportions.

Pakistan has a distinct advantage in the production of commodities such as cotton and basmati rice. At this point, Pakistan's farming is clearly superior to its nearest competitor, India, in both cotton and rice production, but this is not the case for sugarcane, wheat and oilseed crops. For a further discussion on regional comparative advantages within Pakistan see (Khan, Abdur Rahman, June 1988). Consequently Pakistan exports its surpluses of cotton and basmati to meet its deficit in wheat, sugar cane and oils such as palm and soybeans. Pakistan is also now developing export markets for such non traditional products as livestock and poultry products and vegetables and fruits so that export potential of these products is better exploited. Larger foreign exchange earnings are necessary to maintain the momentum of development and finance needed imports.

The goal of full employment in rural areas depends on more rapid growth both in farming and agricultural businesses located there. Full employment in rural areas is important, in alleviating poverty, ensuring continued stable growth, and preventing migration and large scale urbanization. However, the rural area must not remain employers of the last resort nor should they act as a "holding tank" for labor that cannot obtain jobs in other industries. For a further discussion on this point see (Timmer, Peter, C. , "The Role of Agriculture in Employment Generation and Income Distribution in Asia and the Near East," August 1988).

## **Objectives**

The goals of the agricultural strategy are to be reached through active programmes based on several inter-related objectives. The National Commission on Agriculture which completed its work in 1988 has recommended the following specific objectives :

- i) Accelerate the modernization of the agricultural sector to achieve a growth rate substantially higher than the population growth rate so that, the sector can generate resources for sustained development of the economy with a high degree of self reliance.
- ii) Increase agricultural productivity so as to realize future increases in agricultural production, mainly from vertical expansion effectively overriding the limitation on area expansion imposed by limited irrigation water supplies.
- iii) Consolidate self-sufficiency in grains and make determined effort to regain self-sufficiency in sugar production and reduce dependence on edible oil imports.
- iv) Diversify agricultural production and rural employment opportunities by giving more attention to high value products like fruits, vegetables, oilseeds, meat, milk and poultry and increasing their share in the agricultural GDP.
- v) Improve support price system and market mechanism in order to make the system responsive to the needs of the small farmers with the ultimate objective of increasing his earnings.
- vi) Bring about a major transformation in the productivity of the livestock sector to meet the growing demand for milk and meat and to contribute to the well being of less developed areas.
- vii) Develop policy framework to solve fodder and feed deficiencies and improve the genetic make up of livestock.

- viii) Evolve an integrated programme for developing barani, riverain and mountainous areas as a part of a long-term programme to arrest environmental degradation and conserve the country's physical resources of forest, land and water.
- ix) Strengthen the institutional support and provide incentives for generating export surpluses by encouraging crop specialization in the areas/regions which have comparative cost advantages and resource endowment.

It is important to observe that between 1947 and 1977 cultivated area increased at the rate of 0.91% and in the period 1965-87 irrigation water at the rate of 2.42% .In the eighties however this process slowed down to 0.32% and 1.6% and consequently conflicts which in the past could have been resolved through expansion of physical resources, have now come to the surface. A new and more workable balance has therefore to be struck between emphasis on efficiency of resource use and expansion of resources like water land.

The present Government, being committed to the goals of modernization of farming, development of rural jobs and elimination of rural poverty,has also evolved a set of inter-dependant objectives as a guide to future policy. The basic concerns that lie behind this plan of action are recognition of the need to:

- 1 Strike a new and a more realistic balance between horizontal and vertical expansion and to continue efforts to expand availability of water and land as well as increase efficiency in their use.
- 2 Establish a more coherent and effective structure of incentives.
- 3 Improve access of small farmers to information,credit and extension services to increase their productivity and incomes.
- 4 Develop an institutional capacity within the government, to target delivery of goods and services specifically to weaker sections of the society.
- 5 Promote the development of more competitive and efficient markets and marketing systems.
- 6 Promote diversification of the rural economy and development of agricultural businesses.

The specific objectives of the current national agricultural policy are as follows:

**Self Sufficiency in Critical Commodities:** As soon as possible, to achieve self sufficiency in wheat and milk on account of their critical importance in consumption and reduce dependence on edible oil imports. Beyond that to diversify agricultural production on the basis of the country's comparative advantage, bearing in mind changing patterns of consumption in Pakistan and of international trade. In addition greater attention must be given to high valued products such as fruits, vegetables, meat and neglected crops such as pulses to gain the highest revenues and employment in the agricultural economy.

**Special Emphasis on Livestock:** To develop livestock, primarily through improvement in productivity, to meet domestic demand, expand export earnings and promote the welfare of the people dependent wholly or partly on livestock for their living. This will include special programs to develop genetically improved livestock for power, and milk and meat production, range management programs, programs to spread the availability of small goats and poultry to meet the needs of owners with limited resources, programs to collect and market livestock by products and promotional programs, as livestock fairs, to advertise the attributes of livestock produced in Pakistan. Due to the importance of livestock a special program will be developed to enumerate the livestock inventory on an annual basis as is done in other countries where livestock makes a proportionate contribution to the total agricultural economy.

**Forestry Management for the Public Benefit:** Accelerate the speed of fresh afforestation, and the regeneration of forests, where there has been excessive extraction, and raise the productivity of existing forest ranges in order to preserve soil and water resources, increase supply of timber and fuel-wood and provide employment. Existing public forests must be managed essentially for the public benefit. Further consumer programs will be used to demonstrate means of saving fuel. Producer programs at the farm level will be carried out to reclaim water logged and saline soils.

**Structure of Incentives to Promote Agriculture Development:** To put in place a system of incentives which promotes the adoption of more productive technologies and encourages greater investment in agriculture. In particular, to develop a more rational procurement and issue price system which stabilizes and raises the real incomes of producers, allows fall in producer and

consumer subsidies to sustainable levels and generates resources for the government to enable it to protect the welfare of the weaker sections of society. More specifically the system of incentives will be directed to encouraging self sufficiency in the critical crops and promotion of those for which a comparative advantage exists.

**Improved Farm Inputs Production and Distribution:** To make more effective arrangements for the timely provision of adequate quantities of inputs, such as plant nutrients, water, farm power and credit.

**Fertilizer:** To insure fertilizer security and promote its' more balanced use the GOP will take steps to increase production including expansion of domestic capacity as well as improved distribution, storage, marketing and utilization.

**Credit:** Increase and improve the distribution of credit among different farm sizes and regions insuring that remote regions and small farmers have access to credit.

**Land:** To implement a programme for conservation and development of soil resources and reduction of water logging and salinity as well as watershed, range and arid areas. This is essential for the preservation and development of the natural resource base and for the well being of the people living in those areas.

**Irrigation Water:** To rehabilitate deteriorated segments of the irrigation system and strengthen its operations and maintenance funding and management, improve water management practices and privatize public tube wells, where feasible, so that productivity of the system is improved, and ensure greater benefits from irrigation. Assistance will be provided to resolve amiably and expeditiously the issue of judicious and equitable apportionment of the Indus water, keeping historic obligations in mind, as well as and coordinated and timely availability of various sources of water.

**Applied Agricultural Research:** To improve productivity and cost-effectiveness of agricultural research in the country so as to secure a speedy flow of new varieties and technical recommendations. Agriculture research will be carried out to improve farm management and profits, as well as to increase production.

**Institutional Development:** Supporting agriculture research will involve improving the institutional capacity within the government, universities and research organizations for data gathering, analysis, policy making and implementation, monitoring progress and evaluating outcomes, and developing a consultative mechanism comprising governments, producers, processing and trading enterprises, consumers and other concerned groups, in order to resolve conflicts of interest and increase transparency in public policy.

**Human Resources Development:** To develop manpower resources, on the one hand, through better nutrition, improved health facilities, education and training remunerative employment, making available opportunities for developing and participating in a democratic community organization for collective social and economic activities, and, on the other, through the training of agricultural and social scientists, researchers, technicians, managers and communicators. In addition efforts will be made To expand opportunities for productive and rewarding employment for the country's rapidly increasing and youthful labor force. In order to make this program operable efforts will be made to develop the institutional capacity to target population groups that require health, food and educational services.

**Marketing Infrastructure:** To expand, privatize and modernize the marketing infrastructure including transportation, storage, handling, processing and distribution of agricultural commodities. This is essential for ensuring the success of efforts aimed at increased production and productivity. In addition parts of the infrastructure are used for the delivery and storage of farm inputs necessary for increased production. Agriculture commodity processing will be aided by privatization and liberalizing markets. Facilitating support will be given to industrialization contributing towards the overall industrialization of Pakistan and further development of the food and fiber system. Privatized markets and incentives will support foreign trade thus promoting greater production, higher productivity, and price stability. The end result will be an improved balance of trade and an increased share, for Pakistan, in the world agriculture commodity export market.

### **Strategies and Plan of Action**

**Modernization of Farming:** To modernize farming and improve agricultural productivity by strengthening the institutional capacity, enhancing resource efficiency, developing and diffusing more effective technologies, improving

agricultural practices, developing human resources and encouraging a policy framework which provides incentives for increasing productivity.

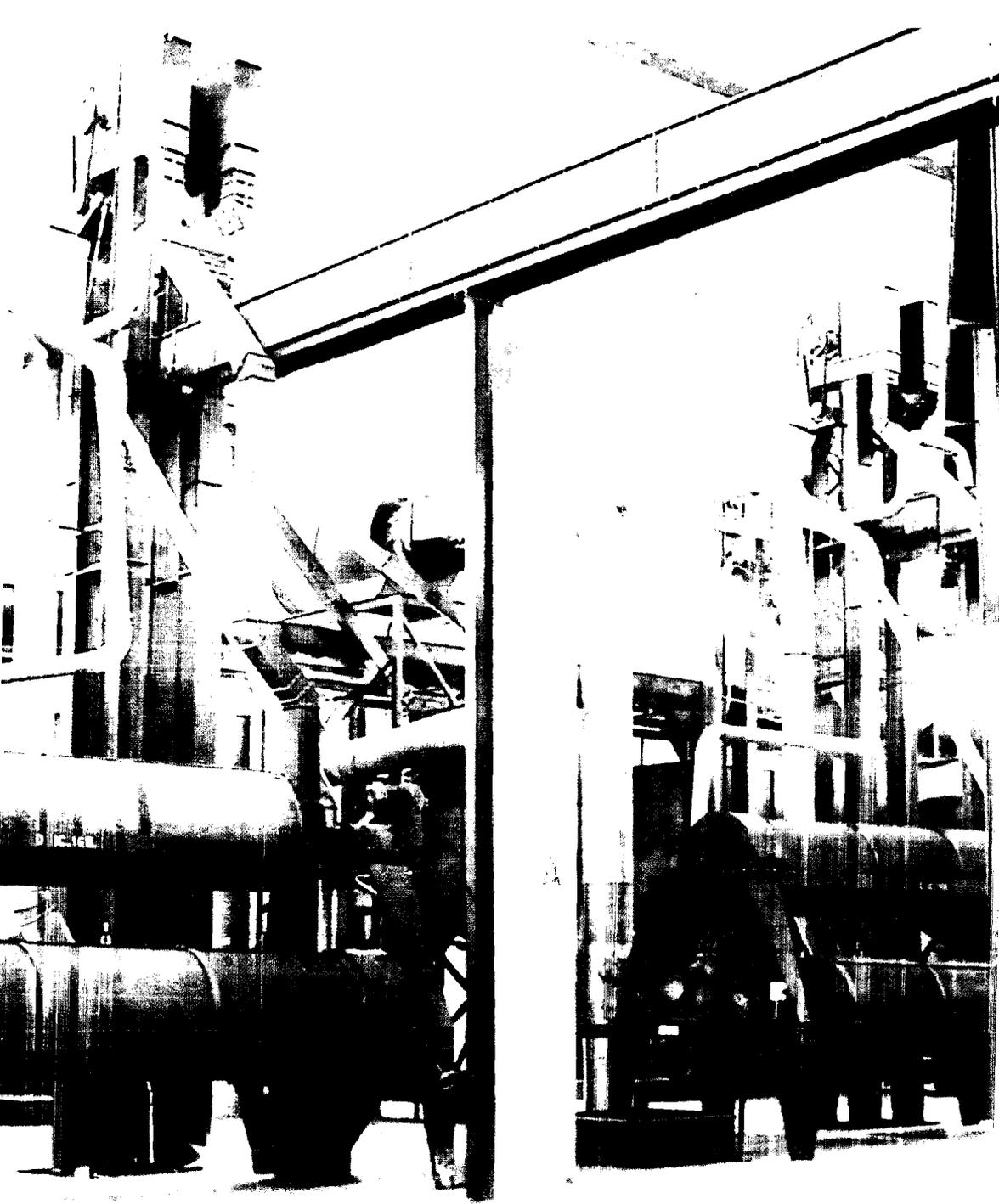
**Small Farmer Strategy.** To alleviate small holder poverty:

- a) Strengthen efforts to improve and expand rural infrastructure, i.e. farm-to-market roads, electrification of villages, provision of education, health and clean drinking water, land improvement, and flood management;
- b) Raise productivity of small-holder farming through development and transfer of appropriate technologies and improved arrangements for delivery of physical inputs and credit;
- c) Stabilize and raise incomes of small farmers through better marketing and procurement systems and a structure of incentives more accessible to them.

**Rural Development:** Promote small-scale industries in rural areas and small towns to:

- a) Ensure employment to the rural poor;
- b) Mobilize local finance and raw material resources;
- c) Enlarge the range of skills in the rural population;
- d) Provide improved farm implements at low cost;
- e) Slow down immigration from rural areas to large cities.

Rural development will be carried out consistently with regional development to mitigate the adverse effects of the uneven distribution of agricultural resources in the country on the incomes of people living in less developed areas, and evolve effective programmes for developing range lands, barani, riverain and mountainous areas.



# **3 The Macroeconomic Setting**

---

## **The Macroeconomic Setting**

As noted in the country strategy the Pakistan economy has an extraordinary resilience to inclement circumstances. The growth rate of the gross national product has been averaging above 5% per annum during the decade beginning from 1975-76. Further, during the last 25 years the growth rate of the economy has exceeded 5.5 percent per annum despite two brief wars with India, large military expenditures, floods, drought, regional dissension, the loss of half of the country, oil shocks, lack of political consensus and unity, economic recession in the 1970's and in recent years, and the arrival of three and half million Afghan refugees. Accompanying the resilience of the economy, there are several persistent problems: a narrow, aberrant tax base that prevents the government of Pakistan from marshalling the resources necessary to solve major problems; a slow change in the relative contribution of the secondary and tertiary sectors in the decade 1975-76 to 1984-85 that failed to support further absorption of labor from the primary into secondary and tertiary sectors; low savings rate and depressed private investment as a result of government appropriation of private savings for financing public sector activities, and a rent-seeking business community that habitually follows collusive business practices and through skillful manipulation of government policies and regulations commands unusually high profits. Examples of unhealthy business influences can be easily found in areas such as import policy, credit policy, agricultural pricing policy and taxation policy.

The revenues of the federal and provincial governments of Pakistan have grown so slowly compared with their expenditures, less that the overall

budgetary deficit reached unacceptable levels in the eighties. For example, as the following table shows, while total revenues increased at the annual rate of 14.99%, total expenditures grew at the annual average rate of 16.42% between 1979-80 and 1984-85. Equally disturbing is the fact that despite substantial increases in incomes, tax revenues increased only at a rate of 11.48. Consequently, as a result of these developments, the overall budgetary deficit of Pakistan moved from 6.6% in 1979-80 to 7.7% of the GDP in 1984-85. In 1987-88 this deficit reached as high a level as 8.4% of GDP after which the proportion began to decline as a result of Pakistan's agreements with the IMF. (see table 1)

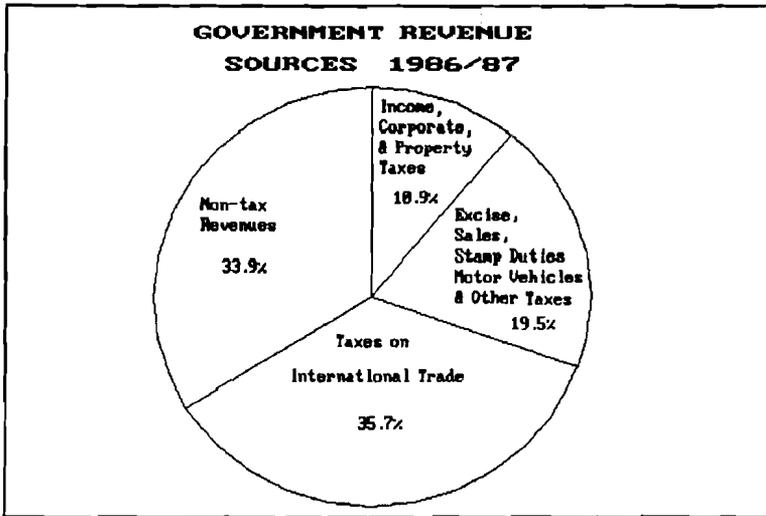
Table 1  
SUMMARY OF PUBLIC FINANCE  
(Consolidated Federal and Provincial)  
(Rs. Million)

Ann. Average	1979.80	1980.81	1981.82	1982.83	1983.84	1984.85	growth
Total Revenue	38502	47002	51930	59181	71290	77403	14.99
Tax Revenues	32507	38846	43003	49029	53646	55963	11.48
Expenditures	54629	63639	71013	87121	100002	116819	16.42
Current Exp.	32824	37839	44544	57738	71945	83769	20.61
Development Expenditure	21805	25800	26469	29383	28057	33050	8.67
Overall Deficit	14663	14618	17174	25654	25147	36777	20.19
% age growth over preceding period							
Total Rev.			22.08	10.48	13.96	20.46	8.57
Tax Revenues			19.50	10.70	14.01	9.42	4.32
Expenditures			16.49	11.59	22.68	14.79	16.82
Current Exp.			15.28	17.72	29.62	24.61	16.43
Dev. Exp.			18.32	2.59	11.01	-4.51	17.80
Overall Deficit.			-0.31	17.49	49.38	-1.98	46.25
Overall Deficit as percent of GDP at market prices							
	6.30	5.30	5.30	7.10	6.00	7.70	

Government of Pakistan revenues are largely collected from customs on imports, federal excise taxes and income from government owned businesses and surcharges on selected businesses. Only 11% of the government revenues are collected from income and corporation taxes. This is a cumbersome revenue collection base because revenues are increased from imports that contribute to a lingering trade imbalance. A summary of the revenue

collections for 1986/87 are shown in Figure 5.

Figure 5



The largest single revenue generating activity is taxes on international trade, which consist largely of customs duties. Most of the customs taxes are import duties, the rest are iqra surcharges, and export duties. Iqra surcharges are a 5% tax earmarked for education.

Non-tax revenues, largely income from property and national enterprise are the second most important revenue generating activities followed by excise taxes. Income from enterprises is made up of revenues from the post office, profit from the telephone and telegraph corporation, trading profit, interest, and dividend and returns from government owned corporations. The majority of returns in this category are from profits on the telephone and telegraph corporation and interest. Trading profits when they occur are of particular importance to agriculture because these are largely profits realized by the Government of Pakistan from procuring cotton and rice and selling for export. Federal excise taxes are charged to selected processing industries. For example sugar refineries are charged a 25% tax on the refined sugar sales.

## *Pakistan Agriculture*

Surcharges, listed here with other taxes, are a category that are of concern to the food and fiber industry because they are charges made to more efficient fertilizer producers to raise their costs to the industry average. These charges for fertilizer were dropped during 1986. However, they remain for natural gas and petroleum.

As expected, large fiscal deficits of Pakistan are accompanied by substantial and fluctuating deficits in the current account of its balance of payments.

### Current Account Deficit as % of GNP

1980/81 81/82 82/83 83/84 84/85 85/86 86/87 87/88

Deficits: -3.4 -4.7 -1.8 -3.1 -4.9 -3.5 -2.0 -3.9

As can be seen above, current account deficits averaged about 4% of GNP in the eighties which necessitated substantial commercial borrowing and draw-down of foreign exchange reserves. The external accounts of Pakistan are virtually always in difficulty because its export base is very narrow. As shown by Figure 3.2 Pakistan's export base is largely dependent on cotton and cotton derived products. This leaves the Pakistan trade balance at risk to the variance of the cotton market. When cotton and commodity prices are high the trade balance is narrowed. On the other hand when commodities are in surplus on the world market the Pakistan trade balance tends to become more deficit. The second largest export of Pakistan, namely rice, is also now faced with the growing threat of competition which makes the balance of trade even more vulnerable.

The narrow base of exports however contrasts sharply with diversified imports. As shown in Figure 3.3, imports spread across chemicals and drugs, manufactured products, machinery and equipment, petroleum and petroleum products, food and fiber products and other miscellaneous items. The importation of machinery and equipment is necessary for new investment and because Pakistan largely assembles machinery. In a similar fashion chemicals and drugs are required because Pakistan business largely formulates medicines, pesticides, paints etc. At this point imports fill an important role in domestic production and the economic development of Pakistan.

Finally, the savings rate of Pakistan has been amongst the lowest in South and South East Asia: it was as low as 11.0% of GNP in 1975-76 and rose to a mere 12.4% Of GNP in 1984-85. On average this ratio fluctuated around only

12% of GNP in the ten years beginning from 1975-76, and is still so low that Pakistan has not been able to finance its relatively limited investment in development without substantial transfers from abroad. There are indeed several factors which have conditioned savings behavior of Pakistans' economy but one of the most conspicuous of them has been the very poor performance of the public sector. As can be seen below, though public sector saving did become positive at the beginning of this decade, its contribution by and large centered around only 1.5% of the GNP and it never exceeded 4% of the GNP.

In contrast with the savings rate, gross domestic investment did reach 16% of the GNP as a result of net external resource inflows. But as the above table shows these inflows even in the course of one decade fluctuated widely and have declined from 7% in 1975-76 to 3.4% in 1984-85. A striking fact that needs to be noted about the composition of economy-wide investment is that while private savings financed 60 to 80% of the total investment, the share of private investment in the total ranged between 35 to 47% only. On the other hand, the share of private investment in total investment in agriculture remained around 80% despite crowding out of private investment in the rest of the economy. (see table 2)

The structural change in the economy of Pakistan is characterised by very slow growth in the labor absorption capacity of its manufacturing and service sectors. Between 1950-51 and 1987/88, the economy of Pakistan experienced highly differentiated rates of sectoral growth. On average, value added in agriculture grew at about 3.3% annually, manufacturing at about 7.5% and services at 6.2%. In this time perspective the share of agriculture in the Gross National Product fell from 53% in 1950-51 to 24% in 1987-88, that of mining remained less than 1% throughout the four decades, the share of manufacturing rose from about 8% to 20% and that of services from 39% to 53%. The net factor income was negative in 1950-51 absolutely but in 1982-83 its share in GNP was as high as 6.1%, though since then it has been falling continuously and was about 3% in 1987-88. A summary of the relative positions of the sectors at the beginning of each of the last five decades since the establishment of Pakistan are shown below. (see table 3)

As can be seen above the pace of structural change has varied a great deal from period to period. For example the share of manufacturing in the GNP did not experience any significant change over virtually two decades beginning from 1960-61.

Also in the ten years 1975-76 to 1984-85, a substantial part of the decline in the share of agriculture was offset by increases in the net factor income from abroad, while the relative positions of secondary and tertiary sectors witnessed very little change. Even more serious is the fact that labor in agriculture and the rural areas has remained high and that the relative positions of the secondary and tertiary sectors has remained stable. Normally as development proceeds, secondary and tertiary sectors absorb the labor that leave agriculture. In the case of Pakistan however in relative terms at least labor absorption capacity of manufacturing, construction, and transport and communication sectors does not appear to have expanded significantly since 1974-75. The following table which portrays the findings of five national labor force surveys shows that between 1974-75 and 1985-86 labor shares of various sectors did not undergo any meaningful change and remained more or less constant. (see table 4)

This pattern of distribution of sectoral output and employment implies that exchange rate and credit policies of the government cheapened capital relative to labor and encouraged capital intensive techniques in manufacturing. The slow growth of employment opportunities in the rest of the economy and relatively low investments on rural infrastructure and rural diversification per capita income (value added) and wages in agriculture declined relative to manufacturing and service sectors.

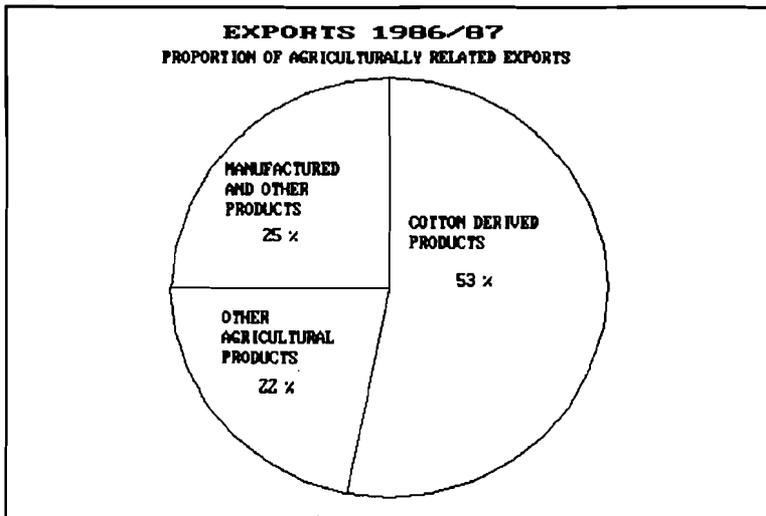
The rent-seeking activities of the business community and governmental controls are two sides of the same coin. The problem of a lethargic business investment community is partially due to the crowding out effect of government investment policy, difficult pre and post sanctioning procedures that must be followed to build new businesses and the restrictive regulations that keep investors and especially foreign investors from, for example, the seed business, fertilizer manufacture, machine manufacture, and repair services. The dominance of the public sector in several agribusinesses and strong government controls over pricing policies of its public companies also discourages competition, technological development, fuller utilization of capacity and new private investment. The general groups of regulations and policies are:

- 1) Import and export policies that restrict new businesses.
- 2) The government approval process including regulations concerning grading, certification, and quality control.

- 3) Agricultural price policies which provide neither coherent nor a stable framework for production or investment. At the same time the narrow bands between administered procurement and issue prices have strongly discouraged private storage and transportation.
- 4) Public sector control over volume and distribution of credit which can discriminate between sectors and individual agents.
- 5) The practice of leveling octroi taxes on goods passing through local government jurisdictions.

On the other hand there is a serious lack of regulation in the area of anti-trust, price fixing, market sharing and other anti-competitive behavior. The same is true of quality regulations requiring labeling and warranting of products. One consequence of over-regulation of the economy is that agricultural business growth is constrained to the growth level of farm and forest production. On the whole agricultural business continued to process, distribute, wholesale, and retail the farm product at about the same levels throughout the decade. Moreover imbalances between capacity and demand

Figure 6



## *Pakistan Agriculture*

Table 2

	SAVINGS AS PERCENTAGE OF GNP									
	75/76	76/77	77/78	78/79	79/80	80/81	81/82	82/83	83/84	84/85
National Savings	11.0	11.9	13.6	11.4	12.7	12.4	11.8	13.9	12.4	10.6
a.Public	0.8	2.4	1.7	1.0	2.0	3.8	3.1	1.1	1.8	0.3
b.Private	10.2	9.5	11.8	10.4	10.6	8.5	8.7	12.8	10.5	10.3
Net External Resource Flow	7.0	6.7	3.2	5.3	4.5	3.4	4.7	1.8	3.0	4.9
	Investment as Percentage of GNP									
Gross Total Investment	18.0	18.6	16.7	16.6	17.2	15.8	16.4	15.7	15.4	15.4
Gross Fixed Investment	18.0	18.0	16.2	15.8	16.4	14.3	14.2	14.1	13.8	13.8
a.Public	12.2	12.0	10.7	10.4	10.5	8.7	9.0	8.7	8.2	8.1
b.Private	5.8	5.9	5.4	5.4	5.9	5.6	5.2	5.4	5.6	5.7

Table 3 CONTRIBUTION OF MAJOR ECONOMIC SECTORS TO GNP

SECTORS	% SHARE 1950/51	%SHARE 1960/61	%SHARE 1970/71	%SHARE 1980/81	%SHARE 1987/88
PRIMARY	52.9	44.12	37.79	29.29	24.38
AGRICULTURE	52.61	43.66	37.31	28.83	23.76
MINING	0.29	0.46	0.48	0.46	0.62
SECONDARY MANUFACTURES	8.1	13	17	16	20
TERTIARY SERVICES	39	43.1	45.52	48.93	53.2
NET FACTOR INCOME FROM ABROAD	-0.14	-0.14	-0.22	5.74	3.1

TABLE 4 SECTORAL DISTRIBUTION OF EMPLOYED PERSONS

Labor Force Agree. Surveys	Manufac- turer	Const- ruction	Trans & Comm.	Others	
1974-75	54.8	13.6	4.2	16.0	11.4
1978-79	52.6	14.6	4.9	16.7	11.2
1982-83	52.7	13.4	4.8	16.6	11.5
1984-85	50.6	13.8	5.6	16.7	12.0
1985-86	54.0	13.4	5.2	16.8	10.6

have also now emerged rather sharply. Misallocation of investment in the past has now brought about substantial over-capacity in UHT milk plants, poultry hatcheries, feed milling and tractor fabrication while domestic fertilizer production, pesticide formulation, seed production and production of tractor and bullock-drawn implements is seriously lagging behind.

In summary, the national tax base needs to be expanded while controlling government expenditures. In addition government expenditures and efforts need to be directed at building the infrastructure of Pakistan so that secondary and tertiary sectors can grow more rapidly. The price of capital needs to be set right and import of technology rationalized to increase the capacity of secondary and tertiary sectors to provide more productive employment opportunities to the labor released by agriculture. National savings rate must be raised and dependence of public sector programmes on private savings reduced. Exports need to be expanded and diversified to improve the trade balance. Finally, the entire regulation system needs to be rationalized paying more attention to anti-competitive behavior, quality control, development of competitive markets and removal of regulations that block the growth of new business.



# **4 The Food and Fiber System**

---

## **Introduction**

In Pakistan, the food and fibre system (greater agriculture) is a major force in economic development. Due to its historic origin, as the basis of the economy, it is now the source of labor for other industrial sectors, capital for new business, revenue for the federal and provincial governments, and exports that balance the imports required by other developing sectors. These key and important functions make the food and fibre system the driving force of the national economy. It interacts with all other sectors using the resources of most other sectors and often provides the raw material for other sectors as well as food and fiber for the household (Mubarik Ali, Rao Shafiq-Ur-Rehman, and Forrest Walters, March 1989).

The food and fiber system in Pakistan, more commonly called farming and agricultural business, can conveniently be categorized into farm inputs manufacturing, farming (agriculture), food and fiber manufacturing, food and fiber storage, transportation and communications and food and fiber wholesaling and retailing. The following will discuss each subsector with particular emphasis on farming or agriculture.

## **Farm Inputs**

Farm inputs manufacturing consists of the fertilizer industry, tractor assembly plants, cultivation machine manufacturing, seed development and production, licensed pesticide formulators and the private and government institutions that

provide farm credit. This is a relatively small sector in terms of its contribution to employment generation, GDP, exports or government revenue. However, development of this sector is essential in modernizing agriculture. Available and low cost inputs as seed, fertilizer, machinery, and capital are necessary to generate growth in agriculture production that will be greater than population growth. Locally produced farm inputs can more nearly meet local farm requirements and protect, to some extent, against the fluctuation in international input prices. The use level and farm situation for each farm input is discussed more fully later in this section.

## **Agriculture and Farming Systems: An Overview**

The agriculture (farm) sector contributes about 25 percent to GDP, accounts for 56 percent of total exports, and employs more than 50 percent of the labor force. Within the farm sector, crop production contributes about 70 percent of the national agricultural GDP. Livestock products make up most of the remaining 30 percent. The average annual growth rate of farm value added was 3.9 percent during the period 1960-1985. This growth rate, however, was not steady. Weather conditions, periods of rapid technical change, the pattern of pricing, and other policy shifts have resulted in a variable growth pattern. The baseline challenge faced by the agriculture sector is to increase farm production at a rate faster than that required to feed an ever increasing population. In the long-run, agriculture must contribute towards: improving the balance of payments, reducing the budgetary deficits, capital formation and creating employment opportunities.

Pakistan's farming is a mix of complex farming systems methods representing alternative production strategies. At the one extreme, large and mechanized farms having easy access to virtually all productive resources are operated on commercial lines as dictated by market forces. On the other hand, a large number of small and subsistence farmers mainly produce to achieve farm level self-sufficiency over time. Cropping systems vary widely because of variations in agro climatic and soil conditions. Wheat is the major crop grown in all cropping regions during winter season. In the summer season, rice, cotton and maize crops are grown in areas suitable for the production of these crops. Crop production takes place both on irrigated and dryland with irrigation contributing about 80 percent of total agricultural production.

Strategies for agricultural development generally reflect the speed with which changes in the sector, from traditional to modern, are expected to occur.

These changes usually portray the outcome of an interaction of major physical, technological and institutional factors. The following sections briefly review the structure and performance of these factors in a historical context, highlight important policy issues, note areas where donor assistance can prove productive, and outline constraints restricting the realization of the full agricultural potential.

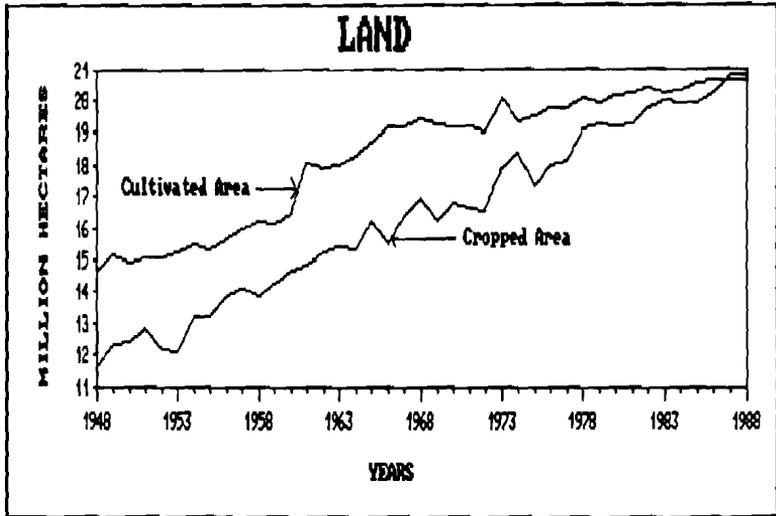
### **The Resource Base of Agricultural Land**

Land is a vital non-renewable resource. Pakistan's total geographical area is 79.61 million hectares of which only 26% (20.92 million hectares) is cultivated, primarily because of constrained supply of irrigation water. Since independence, the total cultivated area has increased by a little more than 40 percent. The growth in the total cropped area is even more impressive. The cropped area which consists of net sown area and area sown more than once has increased from 11.63 million hectares in 1947-48 to 20.90 million hectares in 1988-89, a growth of nearly 80% in forty years. The area sown more than once itself increased in this period from 0.95 million hectares to 4.84 million hectares. Along with these gains in land use however cultivable waste also increased. It is interesting to observe that cultivable waste increased from 9.01 million hectares in 1947-48 to 13.05 million hectares in 1966-67 and then fell back to 10.33 million hectares in 1988-89, a level about a million hectares higher than the level obtained in 1947-48.

Of the total cultivated area about 77 percent (16.06 million hectares) is irrigated, while crop production on the remaining 4.84 million hectares depends mainly upon rainfall. The canal commanded area itself has been grouped into classes on the basis of the nature and degree of severity of its limitations such as water logging, salinity, sodicity and texture. Approximately 30.6 percent (4.16 million hectares) of the irrigation canal command area (CCA) has been classified as class I land; land which has no soil limitations and is suitable for intensive irrigated agriculture. About 43 percent of the CCA is classified as class II land which has minor limitations but is well suited to common crops as rice and wheat. Class III land occupies 5.7 percent of the CCA. Crop yields are low on this land but these can be increased through improved management. Class IV land covers about 3.6 percent of the CCA and its cultivation yields little benefits.

At present about one fifth of the cultivated land in the CCA is affected by water logging in varying degrees and an even greater proportion by salinity. Furthermore about 3 million acres of land are suffering from sodicity. It has

Figure 7 Land: Cultivated and Cropped



been estimated that, in the year 1986, despite three decades of investments, water table was as high as 0-5 feet under 5.261 million acres of irrigated land, 5 to 10 feet under 16.625 million acres and 0-10 feet under 21.886 million acres. Of the 5.261 million acres, 4.8 million acres have been designated as disaster areas. There is little doubt that Pakistan needs to overhaul its entire drainage and reclamation strategy to reduce its cost and to make it effective. The impressive expansion in the availability of land for agriculture experienced in the first three decades of Pakistan faltered in the eighties. For example, the annual rate of increase of cultivable area in 1980-81 to 1988-89 declined to 0.45% compared with 1.11% in the period 1947-48 to 1979-80. Similarly the rate of increase of cropped area in the eighties was only 0.9% in contrast with 1.51% of the first thirty-one years. The annual rates of increase of cultivable and cropped areas in the more recent past i.e. 1984-85 to 1987-88 were even lower: 0.3% for cultivated area and 0.167% for the cropped area when the rate of growth of population was as high as 3.1% per annum. It is well worth considering that population density per square kilometer of cropped area has already increased from 26.25 in 1951 to 51.2 in 1989, a rise of about 95%, despite substantial expansion in cropped area. At the same time, according to

agricultural censuses, total number of farms in the country increased from 3.762 million in 1972 to 44.070 million in 1980 and the average farm size decreased from 13.04 acres to 11.57 acres; in other words, with the rise in population increasing number of farms are operating as uneconomic holdings which cannot provide acceptable levels of living to farming households. In the past Pakistan was able to cope with adverse consequences of the high rates of increase in its population because the productivity of agricultural inputs as a whole, after suffering a decline at the annual rate of 0.2% between 71-72 and 83-84, rose at an annual rate of 3.5% in the period between 1983-84 and 1988-89. But the immediate future may well turn out to be a period of tension for Pakistans' agriculture in relation to the demand being driven by the growth of population and incomes and by the need to expand its export volumes unless its land base is extended through increased supplies of irrigation water and dramatic productivity gains are achieved through technological developments both in irrigated and rain-fed areas.

### **Water**

Pakistan's agriculture is predominantly irrigated and is based on probably one of the oldest and largest contiguous gravity flow irrigation systems in the world; namely, the Indus Basin irrigation system. The system encompasses the Indus River and its tributaries, three major storage reservoirs, 19 barrages/headwork, 12 link canals, 43 canal commands covering about 90,000 chaks (World Bank, 1984). The total length of the canal system is about 40,000 miles with watercourses and field ditches running another 1.0 million miles. The three major reservoirs; Mangla, Tarbela and Chashma, were built by Pakistan after World Bank sponsored Indus Water Treaty was signed between India and Pakistan. No significant irrigation development however came about outside the Indus plains except for a few small irrigation schemes in the North West Frontier province and a few small storages in the Punjab and Sind. (For more on the constraints to production related to water availability see (Seckler, David, 1987).

Irrigated agriculture in Pakistan depends on both surface and ground water sources though the share of the two in the total has been changing over time. The total irrigation water supply at farm gate in Pakistan increased by about 76% from 63.87 MAF in 1965.66 to 112.22 MAF in 1987.88. This represented an average annual rate of increase of about 2.4% over a period extending over 23 years. The changes in the relative shares of surface and ground water in the farm gate total are even more dramatic: surface water constituted about

86% of the total in 1965.66 but with the passage of time it fell to 64% while the ground water increased from 14% to 26% ; in other words, ground water virtually doubled itself in 23 years. Groundwater is pumped both by public and private tubewells. However, the performance of private tubewells has been far more impressive than that of the public tubewells. Water supplies from public tubewells increased from 0.47 MAF in 1960-61 to 7.75 MAF in 1986-87 but pumpage from the private sector increased from 3.70 MAF to 27.02 MAF during the same period.

In the beginning the surface irrigation system was oriented mainly towards kharif(summer) crops. For example, in 1965.66 out of total supplies of 54.75 million MAF, kharif received 39.05 million MAF(about 71%), but over time the availability of farm gate surface water for kharif increased only by 16% in the 23 years being discussed here, when surface water for rabi,i.e.wheat crop, rose from 16 MAF to 26 MAF between 1965-66 to 1987-88, an increase of 66%, Assuming further that about half of the ground water is also used for rabi,the quantity of water consumed for rabi grows from 20-26 MAF to 46-52 MAF, a rise of about 130% between 1965-66 to 1987-88.

Figure 8

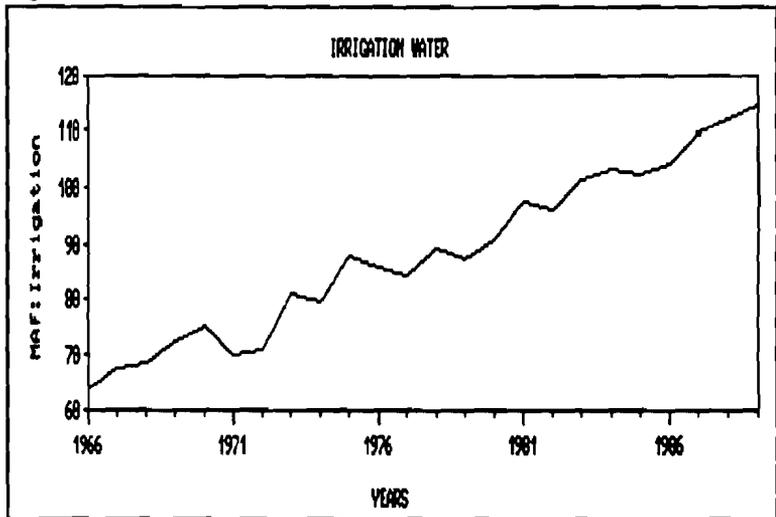
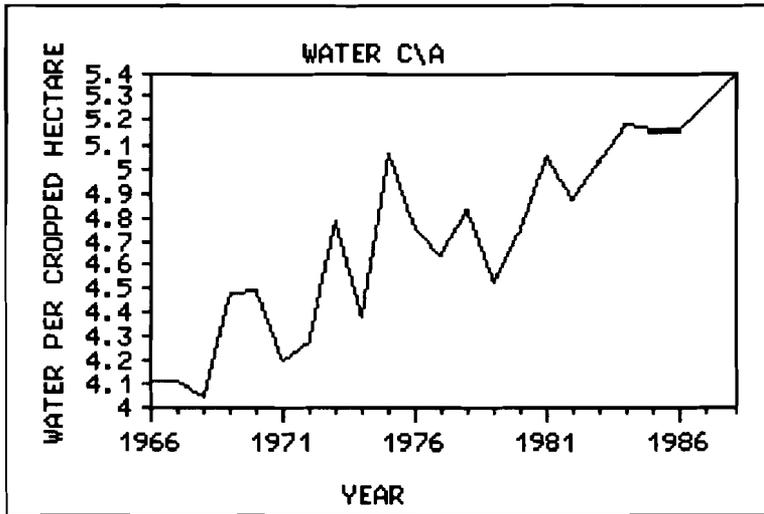


Figure 9



It is important to observe that the past growth in the total availability of irrigated water not only increased the size of irrigated area but also enhanced per acre availability of water within the expanded irrigated areas. The following table which, among other things, shows that increases in irrigated areas did not keep pace with the rate of growth of irrigation water. This also explains that additions to irrigation water supplies led both to extension of irrigation to new areas as well as to an increase in the intensity of farming.

	1960-61	1967-68	1977-78	1985-87
Growth Rate of total farm gate supply	-	3.9%	2.7%	1.6%
Growth rate of irrigated area	-	2.7%	1.3%	1.5%
Feet per acre	2.04	2.22	2.55	2.57

Source: National Commission on Agriculture Report.

The impressive developments of the first three decades in the irrigated system of Pakistan have however slowed down noticeably in the recent past. As can be seen below, the annual growth rate of farm gate water supply, which had increased at the rate of 2.17% between 1966 and 1975, rose to 2.57% in the decade beginning from 1975 to 1985, but when 1980-88 is taken into account the rate of growth declines to 1.73%. (see table 5)

The fact of the matter is that there has been no significant increase in surface water storage since the completion of Tarbela Dam in 1975-76 and that most of the increase in the total supplies from mid-seventies came from ground water sources. But the rate of growth of ground water supplies has also now declined mainly due to reduction in the public tubewell pumpage. For instance, in the eighties the rate of increase of ground water was virtually half of the rate seen earlier, that is, 3.42% compared with 6.53% between 1966-88. It is nevertheless important to observe that ground water not only compensated for virtual stagnation in surface water supplies but that it also provided the much needed flexibility in availability of water for irrigation. It is a well known weakness of Pakistans' surface irrigation system that it is essentially a supply driven system and that it cannot vary its deliveries with crop requirements. In this situation, ground water supplies, wherever these are available, have played a critical role in improving productivity of land as well.

A major weakness of Pakistans' surface irrigation system is that it suffers substantial losses in the process of conveying water from rivers to farmgate: 25% of the total from the canal head to the outlet and another 15% from the outlet to the farmgate. The efficiency of the system did however improve in the recent past and more current estimates show that water losses have now declined from the traditional 40% to about 30%. It should however be noted here that not all seepage from the system represents an irretrievable loss and that according to one authoritative estimate (WAPDA) substantial quantities of surface water losses end up in the ground water regime and become available from pumping by tubewells. Nevertheless high water losses of the system do reflect its very poor state of repair.

It is now widely believed that the technological flaws of the system such as the inefficiency and inflexibility of the conveyance processes as well lack of effective drainage network, have been seriously exacerbated by weak O&M policies of the authorities. Even though benefits to O&M expenditures have been estimated to be high, i.e. a 30% increase in agricultural productivity in six years in response to a 10% increase in expenditure on canals in one year, Pakistans' canal system is deteriorating badly because of continuously deferred

Table 5

Years	Surface Water						Ground Water			Total Water Avail
	-----canal head-----			-----farmgate-----			Pvt.	Public	Total	
	kharif	rabi	total	Kharif	Rabi	Total				
1965.66	65.08	26.17	91.25	39.05	15.70	54.75	6.65	2.47	9.12	63.87
1966.67	66.37	29.59	95.96	39.82	17.75	57.57	8.24	1.73	9.97	67.54
1967.68	61.72	32.98	94.70	37.03	19.79	56.82	9.75	1.97	11.72	68.54
1968.69	66.73	31.58	98.31	40.04	18.95	58.99	10.98	2.82	13.80	72.79
1969.70	69.19	30.66	99.85	41.51	18.40	59.91	12.05	3.54	15.59	75.50
1970.71	60.83	26.53	87.36	36.50	15.92	52.42	13.20	4.33	17.53	69.95
1971.72	60.60	26.05	86.65	36.36	15.63	51.99	14.63	4.48	19.11	71.10
1972.73	68.67	32.23	100.90	41.21	19.33	60.54	15.82	4.81	20.63	81.17
1973.74	63.42	32.65	96.07	38.05	19.59	57.64	17.02	5.40	22.42	80.06
1974.75	62.84	23.59	86.43	37.70	14.16	51.86	18.21	6.95	25.16	77.02
1975.76	62.91	36.00	98.91	37.76	21.66	59.42	19.43	6.16	25.59	85.01
1976.77	58.47	38.86	97.33	35.08	23.32	58.40	20.52	5.65	26.17	84.57
1977.78	64.53	38.16	102.69	38.72	22.90	61.62	21.61	6.21	27.82	89.44
1978.79	60.10	36.53	96.63	36.06	21.92	57.98	22.79	6.62	29.41	87.39
1979.80	68.22	37.02	105.24	40.93	22.21	63.14	23.97	7.03	31.00	94.14
1980.81	68.33	36.48	104.81	42.51	22.70	65.21	25.14	7.44	32.58	97.79
1981.82	66.29	36.54	102.83	41.62	22.77	64.39	26.31	8.16	34.47	98.86
1982.83	68.65	40.08	108.73	41.19	24.05	65.24	26.29	9.96	36.25	101.49
1983.84	62.36	38.15	100.51	42.02	24.45	66.47	27.02	10.20	37.22	103.69
1984.85	63.86	34.57	98.43	38.75	20.75	59.50	27.75	10.08	37.83	97.33
1985.86	60.33	36.01	96.34	38.37	22.44	60.81	28.84	10.74	39.58	100.39
1986.87	61.94	35.63	97.57	44.24	25.45	69.69	29.19	10.84	40.03	109.72
1987.88	62.79	36.56	99.35	45.21	26.03	71.24	29.92	11.06	40.98	112.22
Period	1966-88		1966-75		1975-85		1980-88			
Growth rate of farmgate water availabilities (%)										
Surface Water	0.93		-0.41		1.52		0.79			
Ground Water	6.53		11.35		4.60		3.42			
Total Water	2.42		2.17		2.57		1.73			

maintenance. And at the root of this problem lies the practice of selling water at rates which are far removed from its opportunity cost. As a result, on the one hand, authorities find it virtually impossible to maintain O&M expenditures at adequate levels, and, on the other, because of its relative cheapness, farmers use irrigation water less efficiently than they would had they been paying its real scarcity value.

Finally it should also be stressed that notwithstanding the strides Pakistan has made in increasing the supply of its irrigation water, it has not yet been able to exploit fully the potential of its surface and ground water resources. Pakistan did not succeed in building any sizable dams after Tarbela not only because it is never easy to finance investments required for a large water reservoir, but more importantly, because it failed to develop a political consensus on the apportionment of its water resources among its provinces. Consequently nearly 30 million MAF of kharif water is being allowed to run down into the sea. At the same time irrigation projects such as greater Thal and Dajal extension in the Panjab, Makhi Farrash and others in Sind and Pehru High Level canal in the North Western Province which would have helped expand irrigated areas and increase agricultural production and productivity have remained pending because of the inability of successive governments to resolve the water apportionment issue.

Pakistan's surface irrigation system is perhaps the largest gravity flow system in the world, but its economic output per unit of water diverted at the source is also perhaps the lowest in the world. Some of the important factors responsible for low economic efficiency of the system are: a wide gap between when water is supplied and when irrigation water is needed; excessive water losses in the system; low irrigation efficiency; inadequate drainage; outdated land and water management practices; fragmented land holdings; and the twin menace of waterlogging and salinity. The performance of public tubewells has declined due to poor management and an unprecedented increase in energy costs.

In recent years, the main focus in the irrigation sector was to rehabilitate badly deteriorated segments of the system, introduce improved management practices in the system, and privatize public tubewells. This focus must continue in future years to improve the reliability of the system and ensure a more equitable distribution of benefits from irrigation. It is also essential that political conflict over the distribution of irrigation water be resolved quickly so that waste can be stopped and with greater availability of water cropped area can be extended as well as the productivity of the land improved. At the

same time, in order to maximize social benefits from past and current investments, deferred maintenance should be avoided and operation and maintenance subsidies should be eliminated.

### Labor

Notwithstanding four decades of economic development, agriculture is still the predominant employer in the economy. Successive labor force surveys show that the share of agriculture which in 1963-64 was as high as 60% of the total employed labor force declined very slowly and was still 52% in 1985-89. In this period the share of mining and manufacturing in the total labor force moved around about 13% and that of the rest of the economy increased from about 25% to 35%. In other words, emigration from agriculture ended either abroad or in the services sector. But what is even more disturbing is that in the eighties the rate of increase of the work force employed in mining and manufacturing was distinctly lower than that of the agricultural labor force despite the fact that value added in the secondary sector in this period was on average about 8 to 9% per annum. (see table 6)

Table 6 LABOR FORCE: Rates of Growth. (Percentage)

	1963-64 88-89	63-64 79-80	70-71 79-80	80-81 88-89
Population	3.04	3.03	3.1	3.05
Labor Force	2.73	2.7	3.45	2.24
Total Employed	2.6	2.54	3.15	2.35
Employed Agriculture	1.95	1.46	2.1	1.85
Employed Mining & Manufacturing	2.26	2.4	3.8	1.5

The above table on rates of growth of population and labor force suggests that, with the exception of the decade of the seventies, generally the rate of increase of a country's labor force has been lower than of the total population. But this is so at least partly because the rate of enrollment in educational, vocational and professional institutions was higher than that of population and partly because the participation rate of women in the labor force, measured on the basis of I.L.O. definitions, is low and fluctuating. It has

been estimated that between 1963-64 and 1987-88 enrollment to educational institutions (excluding primary schools) increased by about 5% every year and that participation rates for women never exceeded 10.5% between 1966-67 and 1987-88 and fell to as a low a rate as 6.37% in 1974-75.

The above table also shows that the rate of growth of the labor force in agriculture has always been lower than that of the total labor force which implies that on a net basis labor has been migrating from agriculture to other sectors. This structural change has been brought about by a number of social and economic factors which arise both from supply as well as demand sides of farm labor market. On the supply side, unequal distribution of land, accelerated mechanization policies based on subsidized credit, favorable nonfarm wages, and higher remittances from relatives working overseas have forced farm labor out of the market. On the demand side, increased farm productivity in the last 5-6 years, mainly due to higher cotton yields and conducive price policies, has made the farm labor market more competitive. Foreign remittances also affected the demand for farm labor. Consumers were able to pay higher prices for agricultural products; thus enabling the farmers to offer high wages to workers. Studies have shown that labor shortages at harvesting time in various geographic pockets are quite serious. However, as discussed in an earlier chapter, the pace of structural change in Pakistan has been rather slow to a large extent because the industrial sector has developed with high capital intensity and low labor absorption capacity.

Historically, the average annual growth rate of the total labor force as well as of the force employed in agriculture has been greater than that of the cropped area which caused considerable pressure on the cropped area. Nevertheless, labor productivity increased overtime because of biological and chemical technologies. In other words, labor increases per cropped acre were outweighed by the increases in agricultural production. However, relative to manufacturing, increase in value added per worker in agriculture was much smaller; for example, increase in value added per worker between 1963-64 and 1988-89 in agriculture was a mere 50% compared with more than 200% in manufacturing. Consequently last year, 1988-89, value added per worker in manufacturing was virtually three and half times the value added per worker in agriculture. (Another way of looking at this change in per worker productivity is that productivity of all inputs into agriculture has been rising at least as fast as labor force in agriculture so that in the end there is no decline in labor productivity.) These calculations imply that a vast majority of the labor force of the country has been held up in agriculture which has not only exacerbated inequalities in income distribution but also stood in the way of faster economic development of all sectors.

Rural areas in Pakistan are not merely deprived of a reasonable physical infrastructure, a vast majority of their labor force is also lagging behind in elementary education and skill development. For example, according to 1981 census, literacy rate in rural areas was virtually half of the urban areas for males and one fifth of the rate for females. In contrast with the past, farmers are now faced with complex and changing technologies and highly unstable and confusing price signals. Relative to the present day context, their level of literacy and skills is so low and the outreach and quality of the message of public information and extension services so poor that most farmers are unable to cope with the pace of change or to exploit the full potential of such expensive inputs as fertilizer and irrigation water. At the same time, the economic policy framework within which farmers make their decisions on production, consumption and exchange changes so frequently and unpredictably that it only serves to compound their difficulties. A more stable and holistic approach which gives adequate attention to human resource development as well, is now indispensable if agriculture is to gain momentum for growth. The point is not simply to transfer rural labor force to urban, informal, service sector but to create remunerative employment opportunities in rural areas through investment in physical and social infrastructure and diversification of rural economy through the establishment of competitive marketing structures and agribusinesses.

### **Capital**

Both public and private sectors make investments in the agricultural sector. Public sector investments mainly focus on the development of irrigation and drainage facilities, agricultural research and extension, marketing and storage.

On-farm investments are usually recorded as private sector investments. Historically, the direct public investment in agriculture has declined from 9.5 percent of the total public investment expenditure in the First Plan to 4 percent in the Fifth Plan and 3 percent in the Sixth Plan. This progressive reduction has created a substantial backlog of development which adversely affects the productive capacity of the agriculture sector. For a more detailed discussion of farm credit see (Scott, William and David A. Redding, March (1988)

Private capital formation in the agricultural sector has increased from Rs. 463 million in 1970-71 to Rs 7402 million in 1986-87. Its share in total fixed investment ranged between 6 and 11 percent during this period. The average capital-output ratio in the economy was about 0.14 in the last 15 years. In the

agricultural sector, however, the private capital to output ratio was smaller than the overall ratio of the economy. Historically, within the agricultural sector, the private capital-output ratio has increased from 0.038 in 1974-75 to 0.155 percent in 1979-80. In the eighties, this ratio fluctuated between 0.061 in 1980-81 and 0.116 in 1988-89.

Both the public and private investment in agriculture has to be increased to attain agricultural growth rates projected in the NCA report. The output-employment elasticity estimated for the period 1963-64 to 1986-87 was 0.57; suggesting the need to make increased investments in this sector to support employment.

### **Physical Inputs**

Apart from traditional agricultural inputs discussed above, modern agriculture involves the judicious use of other variable inputs such as seed, fertilizer, plant protection, credit, and mechanization. Current cultural technology and farm management constraints are additional issues in agricultural development.

### **Seed**

Crop seeds are a strategically important input that can enhance or constrain production. The basic genetic capability transmitted through seed allows the productive use of water, fertilizer and cultural practices.

The Seed Industry Project was started in Pakistan in the mid- 1970s. The major objective of the project was to replace the traditional seed production system with a system that involves: variety release, seed multiplication, processing, certification, storage and marketing. The provincial corporations established to implement this project have had some initial difficulties in achieving the planned targets but considerable progress has already been made by them in providing and getting farmers to adopt improved seeds. Total improved seed distribution has increased five fold from 22.54 thousand tonnes in 1971-72 to 117.82 thousand tonnes in 1988-89. Wheat seed constitutes about two thirds of the total seed distribution, followed by cotton with a one fourth share. For detailed description of wheat seed production and distribution see Chaudhry, A. and P. Heisey, 1988.

Research on variety evolution for wheat, rice and cotton (in the Punjab) needs to be accelerated and extended to other crops, particularly sugarcane and cotton (in Sind). In the case of wheat seed, there appears to be an overall lack

of coordination among institutions associated with policy formulation and actual implementation of seed production programs. The price of seed produced by the public sector agencies is relatively high which in turn discourages its use. The existing marketing network is weak, and needs to be both expanded and strengthened to ensure the availability of seed at the farmers' door step. Subsidies of public sector distributors inhibit participation of private sector firms. However, in recent years, some private sector firms have started producing cotton seed and hybrid seed of minor crops. Nevertheless, low price high volume seeds as wheat, rice and cotton would have to be handled in the public sector or shifted to the private sector with higher priced unsubsidized seeds.

Having reached the current stage of development in seed production and distribution there are now a number of hurdles that need to be overcome to encourage further growth. These include the development of the improved seed industry in all phases of production and marketing over a broad array of crops and varieties. Currently, there are only a few private seed companies involved in producing and marketing seeds. These companies are also encumbered by the limits on foreign investment in land for seed production, lack of trademark protection, corporate investment regulations, unduly restrictive import policy, and non availability of loans for operating capital. The Seed Act of 1976 therefore needs to be amended to establish a sufficiently broad framework for the development of vigorous domestic and foreign private seed production and distribution companies. This Act was originally designed to bring about only a public sector seed system to introduce and promote use of improved seeds and it did not include any regulations to support private sector seed marketing or seed production. But given the present need for variety development and an efficient distribution system it is essential that an active private sector, comprising both domestic and foreign enterprises, is allowed to develop and encouraged to work in cooperation with the public sector within the framework of a national seed system. The amended Act should also provide for the establishment of supporting institutions for variety registration, seed certification, seed quality control, research and varietal protection, and registration of seed companies.

At present both private companies and public corporations are also limited by the slow and cumbersome procedures for certification and the delay and prohibition on the import of seed for breeding and testing. A single authority is therefore required for dealing with seed variety testing and registration, certification, quality control, variety protection and promotion. It is also important that seed industry is declared a high priority industry and a

programme of incentives is formulated to promote it. Among other things, this programme should deal with issues such as investment deregulation, credit, tax and import regulations.

### Fertilizer

Fertilizer consumption has grown from insignificant levels in the early sixties to a major farm input and industry today. For example, annual fertilizer offtake in Pakistan has already gone up from 379.2 thousand nutrient tons in 1971/72 to 1,753 thousand nutrient tons in 1987-88 showing an average annual increase of 10 percent. Fertilizer use has reached about 76 Kg per hectare in 1985-86 compared to 2 kgs in 1960-61. (see table 7)

Table 7 NUTRIENT CONTENT

PRODUCT	%N	%P	%K	DESCRIPTION
UREA	46			Urea
DAP	18	46		Di-ammonium Phosphate
TSP		46		Triple Superphosphate
SSP		18		Single Superphosphate
CAN	26			Calcium Ammonium Nitrate
AS	21			Ammonia Sulphate
SOP			50	Sulphate of Potash

Major factors that induced the farmers to use larger quantities of fertilizer were introduction of new seed varieties, increased availability of irrigation water, the subsidy on fertilizer, expansion in institutional credit, relative stability in fertilizer prices, favorable crop price support programs and assured markets for the marketable surpluses of major crops.

Nitrogen fertilizers are domestically produced with supplemental amounts imported, for the most part, by the Federal Directorate of Fertilizer Imports. Phosphate fertilizers are largely imported and their prices are set by subsidizing the Federal Directorate of Fertilizer Imports to pay international prices and distribute to the various private and government fertilizer companies at lower than the cost of importation. Before "deregulation," during May 1986, ceiling nitrogen fertilizer prices were set by the Government of Pakistan and made effective by charging surcharges to low cost producers, forcing their costs up to the ceiling price, and paying subsidies to high cost producers, reducing their effective costs to the level of ceiling prices.

TABLE 8 EXISTING FERTILIZER PLANTS IN PAKISTAN

PLANT	LOCATION/PROVINCE	PRODUCT	ANNUAL STARTUP	CAPTY(MT)
<b>Private Sector Plants</b>				
Exxon	Dharki/Sind	Urea	Dec. 1968	230,000
DH	Sheikhupura/Punjab	Urea	Oct. 1971	346,000
FFC	Goth Machhi/Punjab	Urea	May 1982	570,000
				1,146,000
<b>Public Sector Plants (MFC)</b>				
Pak-Am	Daudkhel/Punjab	AS	1958	80,000
Lyp/Chm.	Fd/J.wala/Punjab	SSP	1958	103,000
Pak-Arab	Multan/Punjab (Org)	Urea	1962	59,000*
=	(Org)	AN	1962	103,000
=	(Exp)	CAN	Nov.1978	459,000
=	(Org)	NP	Jan.1979	304,000
=	(Exp)	Urea	Mar.1986	100,000
Pak-Saudi	Mirpur Mthalo/Sind	Urea	Jun.1980	554,000
Pak-Steel	Karachi/Sind	AS	1981	5,000
Pak-China	Haripur/NWFP	Urea	Apr.1982	99,000
			Sub Total:	1,817,000
			Grand Total:	2,963,000

\*May not be added in the total as the capacity was later expanded in 1986 which is counted in the total.

Source: FFC, Fertilizer Data Book 1986

All fertilizer prices were further held constant over all areas of Pakistan and throughout the year. This was achieved with a subsidy to cover the cost of distribution and storage. These costs are commonly called "incidentals." The present fertilizer capacity is given below. (see table 8)

The fertilizer industry in Pakistan is now faced with a serious problem in providing supplies of fertilizer necessary to maintain self sufficiency in major food crops. Currently fertilizer sales are outstripping domestic nitrogenous fertilizer production. The deficit is made up with imports and is roughly equal to the production of a modern plant. Production of additional fertilizer has stalled in the past despite the sanction of new facilities and the start of remodeling in a number of fertilizer plants. Progress has however now been made to hasten the development of additional capacity. Pakistan also imports large quantities of phosphatic and potash fertilizers. The growing deficit of both nitrogen and phosphate fertilizer has strained acquisition, storage and transportation facilities causing widespread local shortages at critical times. Stronger support will therefore have to be given to the private sector to increase the production of nitrogen fertilizer and to develop long term purchase contracts with phosphatic producers in order to guarantee supplies and stabilize purchase prices. For the time being however planning, import and distribution of required quantities of fertilizer throughout the country at critical times in the crop cycles continues to be a serious problem.

During May 1986 the Government of Pakistan began to deregulate nitrogen fertilizer prices and to reduce subsidies and surcharges to the nitrogen fertilizer industry. Later in February 1987 at least all fertilizer imports were deregulated. Surcharges and subsidies to individual nitrogen producing companies were for the most part eliminated leading to important reductions in the subsidy costs of the national fertilizer program. In addition subsidies on company nitrogen distribution or "incidentals" are no longer paid. However, with the reinstatement of subsidies on imports subsidies to the nitrogen sector can again become burdensome to the Government of Pakistan.

It has been estimated that some increases in nitrogen prices would not seriously affect consumption of fertilizer or crop production. For example, one study shows that a 10% increase in fertilizer prices on a representative 20 acre farm in the mixed cropping zone of the Punjab Province causes no change in the linear programming solution for crop acreage or fertilizer use. "Total fertilizer use at the farm remained the same." Also, "In this case, net income per cropped acre was Rs. 1782.09 which was about 2% less than the income obtained with current prices," of fertilizer. In fact higher prices might

well stimulate more interest in investing in new plant capacity. Yet for political reasons, the government of Pakistan is likely to face difficulties in allowing nitrogen fertilizer prices to rise as import prices increase with upward trending gas prices. The farm landlord dominated National Assembly would require a very strong information program.

Fertilizer subsidies amounted to Rs 1966.9 million in 1988-89 despite efforts of the government to reduce them to as little as possible. Most of these subsidies in recent years have been provided on phosphatic fertilizers. The subsidy on nitrogenous fertilizer has been gradually eliminated. Elimination of the subsidy on phosphatic fertilizer may discourage its use, but at the same time removal or reduction of the subsidy would narrow the budgetary deficit and improve the resource allocation process. It is believed that if import functions are entrusted to the private sector, market prices would not increase as much as are generally argued. Problems relating to high market price, if any, can be balanced by increasing the purchasing power of the farmer through expansion in procurement prices.

There is an urgent need in the country for the formulation and dissemination of fertilizer recommendations that are applicable to the variety of local soils and conditions. But a well developed scientific procedure for providing fertilizer recommendations for the farmers in the different ecological zones of Pakistan has not yet been created in Pakistan. There is a realization that the type and amount of fertilizer applied must be related to soil analyses showing actual plant nutrient deficiencies. The response of fertilizer has been found to be distinctly better when the use of fertilizers is combined with the appropriate cultural practices. It is therefore necessary that the extension services working in the country establish local soil testing laboratories that should test soil samples for plant nutrient deficiencies, harmful PH levels, and chemical and minerals deposits. For a detailed discussion of the fertilizer industry see (Walters, Forrest, Tony Teele, Anthony Ward and Khaliq-ur-Rehman, January 1985).

Overall, the Pakistan fertilizer industry appears to be moving into a new era with more support from the private sector and what appears to be a new level of crop yield response to fertilizer. In this setting fertilizer policy agenda has three major areas of serious importance: (1) progress in de-nationalizing Pak-Saudi, Pak-Arab and Fertilizer Marketing Limited, (2) new policy issues that could be facilitated with a reorganization of the policy making process, and (3) a new competitive setting requiring the development and enforcement

of fertilizer quality standards, as well as the organization of governmental activity to monitor fertilizer prices and quantities.

### **Plant Protection**

Plant protection measures in Pakistan are currently comprised largely of the use of pesticides which have grown from about 915 tons in 1981, when pesticide subsidies were removed and the private sector inducted, to 3455 tons in 1985. In 1985, cost of imported raw material was Rs. 2210 million. The cotton crop accounts for over 70 percent of the total consumption of pesticides. Undoubtedly, plant protection is an expensive input but returns are also high.

Total cost of pest control measure in 1987 was about Rs. 3000 million, while the area sprayed was 1.6 million hectares. This means that average cost per hectare sprayed is about Rs. 1900. Urgent measures are needed to contain its use and reduce the cost. Pesticides use can be reduced by practicing Integrated Pest Management, while import from more diversified sources could bring the prices down.

Substantial evidence is accumulating which indicates that residue chemicals used as pesticides pose a major health risk. It is therefore necessary that the government institute, as soon as possible, a programme to test and warn the public and farmers of harmful pesticides and to establish an integrated pest management system.

### **Agricultural Credit**

The impressive growth in agricultural credit has been an important factor in the growth of agricultural sector.

The total amount of agricultural credit provided by various institutional sources, Rs. 17 billion in 1987-88, was about 13 percent of the GDP generated in the agricultural sector and reflects a ten fold increase since 1976-77. The ratio of institutional credit as a proportion of sectoral GNP of agriculture has increased three fold from 4 percent in 1976-77 to about 13 percent in 1986-87. The total agricultural credit increased from Rs. 2,048 million in 1977-78 to Rs. 15,158 million in 1986-87. Total subsidy on agricultural credit has increased from Rs. 44 million in 1977-78 to Rs. 923 million in 1986/87.

A recent study on rural credit (Sohail J. Malik) has reported that in 1985 "the

amount weighted mean rate of interest on rural borrowing (after excluding the zero rate component) was 18 percent. On institutional loans it was 12% and non-institutional loans 22%. The dispersion around these values are much higher for non-institutional rates than for institutional rates. For example the mean rate on borrowing from professional money lenders is 33% with a standard deviation of 20%, whereas the mean rate from commercial banks was 12.27 percent with a standard deviation of 2." This study has further revealed that current on-farm expenditure accounted for only 9% of total borrowing in 1973. In 1985 however there was a remarkable increase in borrowing for this purpose and now accounted for 32% of the farm household borrowing. On the viability of rural credit market, the study argues that "the ratios of repayment to borrowing have actually gone up for all categories of borrowers so that the worsening access is not the result of poor repayment performance".

Despite the very impressive expansion in agricultural credit, there is ample evidence to support the fact that credit is not reaching a vast majority of farmers; particularly small ones. Both the two large national surveys; namely, 1973 and 1985, confirm this. The excessive documentation involved and the cumbersome procedural requirements are the major constraints to the spread of the institutional credit.

Under another scheme, cost free production loans are provided to farmers, with a maximum of Rs. 12000 per borrower per year subject to a limit of Rs. 1,000 per acre. These loans are usually in kind and repayable within 12 months. However, there is a general complaint that these loans do not reach the small deserving farmers due to the large scale misuse of proxy loans, family loaning, and paper loaning (Scott, William and David Redding, March 1988). Subsidized interest rates, though well intentioned, have also played a role in misdirecting credit and impeded efforts to target loans to small farmers.

The credit used by small farmers is undoubtedly far below their potential needs. If improved technology were more widely understood and used, there would be further major pressure for additional financing. In the absence of credit programs for land purchases, small farmers cannot expand their farm units, particularly where they are too small to generate savings. The requirement of property, or a guarantor with property, restricts tenants and landless householders from approaching credit institutions.

At the same time long term lending has suffered from somewhat of a narrow focus. These programmes have remained limited mainly to tractors and other

capital investments like tubewells, land and water course improvements. Dairying however received only marginal attention. The government will therefore have to encourage lending institutions to develop programmes for the diversification of their long-term lending.

### **Farm Mechanization**

The most popular forms of mechanization in Pakistani agriculture have been tubewells, tractors and threshers. From 1971-72 to 1987-88 the tractors operating in agriculture increased rapidly at an average annual rate of 12 percent. There were 218,544 tractors operating on farms in 1987-88. In the past more than ten makes of tractors could be imported into the country but in 1978-79 five makes such as Massey Ferguson, Fiat and Ford were standardized. The total number of tubewell have increased from 76 thousand in 1968 to 293 thousand in 1987-88. Tractors and threshers have spread to the small and the medium farmers despite controversies surrounding mechanization. Use of the tractor for haulage is perhaps the dominant feature of the utilization of tractors owned by the small and medium farmers. Threshers, unlike tractors, are largely made locally and are in widespread use for the wheat crop. It is generally believed that there is roughly one thresher for every two tractors.

There has been considerable difference of opinion in the country regarding the most appropriate extent of mechanization in agriculture. On the one hand, labor displacement has been the issue. On the other, the lack of use of the modern implements has been regarded as an impediment to improved productivity of agriculture. For example, it is now widely agreed that mechanization is clearly desirable for operations like rice transplantation and for reducing the conflict between cotton and wheat and rice and wheat. While studies on labor displacement effects of tractorization have been inconclusive, combine harvesters as the Melinda Smale study shows are unambiguously labor displacing and highlight the stark trade-off between efficiency and employment. In short choice of appropriate technology to maintain a balance between modernization and employment and income distribution has remained an important unresolved question.

Tractor importation, manufacture, distribution and repair probably represents the most important form of farm mechanization. The data show that farmers are giving up bullocks at a faster rate than the acquisition of tractors. Credit policies of the donors and government have also played a major role in promoting the use of tractors; in fact it is an open question whether

tractORIZATION would have proceeded as rapidly as it has in the absence of privileged access to credit for purchase of tractors. However there are also several constraints on rapid development of indigenous tractor industry such as lack of standardized raw materials for local manufacture, skilled labor for assembly and repair and a freely operating retail mechanism and on demand for tractors at their present prices without the intervention of financial institutions. After a tractor has been purchased a major problem is the limited use of tractor drawn implements. This is important because the most immediate impact on crop yields of tractorization comes from plowing with tractor power. Chisel and furrow turning plows are not sold with tractors. Use of the tractor for haulage is perhaps the dominant feature of the utilization of tractors owned by the small and medium farmers. The total number of tractors and tubewells available in Pakistan are shown in Appendix II.

Threshers are now in widespread use except in remote areas. Most threshers are tractor powered and are used largely for the wheat crop. Nearly all threshers are locally made and can be repaired with parts made at near by repair shops. Manufacturers of threshers have some difficulty in obtaining raw materials and refunds of duty paid on imported raw materials used in local manufacture of farm machines. Purchasers of threshers have difficulty assessing the quality of domestically produced threshers since there are no legislated or voluntary standards for manufacturers. The manufacture of threshers as an industry has the potential to become an important source of rural economic growth if the government supported its future development by establishing training programmes for design engineers and manufacturers, and participated in the development of industry standards and helped the industry evolve into an exporter of quality threshers.

The small farmer has a particularly difficult problem in purchasing quality animal drawn machinery. The many local manufacturers usually purchase raw materials in such small quantities that wholesale prices are not available. In addition supplies of cast iron, high carbon steel, mild steel, wood, coal and sheet metal are not available in uniform quality to the small manufacturer. After animal drawn machinery has been purchased there is little technical assistance from public agencies in its effective use and repair. This is another area that needs government attention and support.

The installation of private tubewells has been a development of considerable importance. Installation of tubewells has been encouraged through cost subsidization. The average proportion of subsidized tubewells over the last 10 years was 27 percent of the total installed. The annual subsidy on the

installation of private tubewells has been about Rs. 16 during 1985-89. The charges for agricultural uses of electrical energy are also subsidized which tempts farmers to convert from diesel engines to electricity. This however is undesirable in view of the fact that the total cost of electricity is much higher and the slow installation of tubewells as farmers wait for electricity to be brought to the local area. Nevertheless a subsidy, which does not discriminate between electricity and diesel, appears to be necessary to continue expansion of tubewell produced irrigation water.

### **Agrarian Structure**

**Farm: Size** There are 4.07 million farms in Pakistan cultivating 19.06 million hectares of land. About 74 percent of the total farms are categorized as small farms (below 5 hectares), but own only 34 percent of the total farm area. Medium farms (5 to 10 hectares) own 25 percent of the total farm area and constitute about 17 percent of total number of farms. Large farms (10 hectares or above) are only 9 percent of the total farms but occupy 41 percent of total farm area. The average size of small, medium, and large farms is 2.19, 6.61, and 21.10 hectares, respectively. In summary roughly two thirds of the land is farmed by one fourth of the total farmers who are classed as medium and large sized. On the other hand, one third of the land is farmed by three fourths of the total farmers who are classed as small farmers. Nearly all the marketable surplus is thought to be produced by medium and large farmers.

**Land Tenure:** The tenure system in Pakistan can be classified into three categories: cultivated by owners, partly cultivated by owners and partly by tenants, and these cultivated entirely by tenants. Owner operated farms are 55 percent of the total farms and occupy 52 percent of total farm area. About 19 percent of total farms are operated by the owner-cum-tenant category, cultivating 26 percent of total farm area. About 26 percent of total farms are tenant operated, occupying 22 percent of the total farm area. The average size of owner, owner- cum-tenant, and tenant farm is 4.26, 6.35, and 3.91 hectares, respectively.

**Size and Tenure in a Regional Context:** Land concentration is quite high in the Sind Province and quite low in the North West Frontier Province. In fact, in the Punjab and North West Frontier Provinces a very high percentage of the farm area is in the hands of owners, of 10 hectares or less. Most of the small farms are cultivated by owners, except in Sind where tenants seem to

dominate. Part owner and part tenant cultivation is quite common in the Punjab and North West Frontier Provinces particularly on farms of medium sizes. Over 68 percent of large farms and their area are owner operated in the Sind and Baluchistan.

**Farm Fragmentation and Land Reform:** Farm fragmentation into two or more separated holdings is a significant constraint on agricultural production. In Pakistan, 62 percent of total farms are fragmented. Out of these farms, 39 percent are fragmented two or three times; 12 percent four or five times; 7 percent six to 9 times; and 4 percent more than ten times. Fragmentation is more serious in the North West Frontier Province and Baluchistan where 77 and 72 percent of total farms are fragmented. In the Punjab and Sind, fragmented farms are 62 and 52 percent of total farms, respectively.

Land reforms were instituted in Pakistan in 1959, 1972 and 1977. The main objective of these reforms was to improve equity in land ownership and to increase the intensity of land use. The implementation of all the three reforms fell far below the public expectations. An unsatisfactory feature of these land reforms was that less than half of the excess land acquired from the big land owners was redistributed to target groups. Also, the least productive lands were surrendered and transfer within families preserved family control of large holdings. In the eighties land reform altogether ceased to be a preoccupation of any political party.

**Institutional Environment and Price Policies:** The farm production process is an interaction of physical and cash inputs, an existing physical marketing infrastructure and the overall agricultural policy environment. In Pakistan, the magnitude of the marketing problem is large due to the structure and nature of markets and government procurement programs. Historically, the nature of incentives faced by the farmers have altered as a result of a complex set of pricing and tax policies implemented by the government.

**Marketing Infrastructure:** An efficient marketing system is a prerequisite for sustained agricultural development. It affects both producer incomes (through prices farmers receive for their products) and consumer welfare (via prices consumers eventually pay for agricultural commodities). In the ultimate analysis, the efficiency of the farm sector depends not just on farm production costs and yields, but equally on what happens to the product from the time it leaves the farm and reaches the consumer. In Pakistan, however, the physical and institutional marketing infrastructure for agricultural commodities is generally weak and is increasingly regarded as inadequate to meet the needs

of a growing modern economy.

At present a large number of agricultural commodities and livestock products are completely in the hands of the private sector with no restriction on their movement, and prices being generally determined by supply and demand as is the case for poultry (Walters, Forrest, 1987). On the other hand, there is substantial public sector involvement in the marketing of the main foodgrains and cash crops. (Pinckney, Thomas C. 1987 and Cornelisse, Peter A, and Bart Kuijpers, 1985). The government intervenes extensively in marketing by setting minimum support prices for nearly all major crops, regulates their marketing, physically procures a large proportion of the marketed surplus of certain crops, and is a major exporter of Pakistan's main agricultural exports - rice and cotton.

The physical marketing facilities such as transportation, warehousing, cold storage space, and processing facilities are usually not sufficient for the volume of product moving through the market. Small farmers usually sell in the local markets because their weak financial position together with their small marketable surpluses make it difficult for them to withhold the produce for better prices. Several marketing anomalies have emerged as a result of imperfections in the market caused by government programs and lack of marketing facilities. For example the narrow margin between GOP prices for procurement and distribution of wheat by a public sector agency limits private development of storage and distribution facilities (Pinkney, Thomas C, Naved Hamid, Marshall Klaus and Alberto Valdes, May 1988). Market imperfections work against both the producers and consumers. The producer receives up to 65 percent of the consumer price for non-perishable commodities and 25 to 55 percent of the perishables.

The proportion of marketable surplus sold to public and private marketing institutions varies by crops and regions. These variations depend upon the proximity of regulated markets, availability of institutional marketing agencies, status of roads linking with markets, transport facilities available and the general attitude of the farmers. Less than 50% of villages are presently connected with all-weather roads. As a result, marketing opportunities for farmers are abridged and marketing costs for the entire agribusiness economy are excessively high. The estimated requirement of roads to serve the socio-economic needs of the country in 1982 was 450,000 kilometers of which 350,000 kilometers of village roads, farm to market roads and other tertiary roads need to be constructed. This requirement was nearly three times the actual availability of roads in that year.

At the same time the number of markets available to farmers is very limited and their physical structures are poorly designed and located in congested inner city areas which only aggravates the problems of marketing. The ratio of markets to both area and population is extremely low. At present there are only about six hundred and fifty markets serving approximately 45,000 villages.

Storage facilities are, inadequate, and poorly managed. Considerable quantities of wheat procured by PASSCO are currently stored in the open under plastic covers or tarpaulins. Information on proper storage methods and on the principles of good storage management is not widely available. As noted earlier, to some extent this is due to the government procurement programs that do not include a price variance large enough for private storage and transportation to develop.

Another serious marketing problem is the inadequate flow of information on prices and quantities. In the first place the rural communications network is weak as the number of telephones, post offices, televisions, and radios is entirely inadequate. Secondly, farmers do not rely on the prices disseminated by the media because prices are generally given in ranges and not specific to particular grades. In addition farm level prices simply are not collected. Average prices are not weighted by volume of marketings and marketing margins are not calculated. The lack of accurate and timely market information on prices, available quantities, forecasts of future supplies has severely affected efficient decision making and weakened farmers' bargaining power.

**Policy Environment:** Proper incentive structure for agricultural production plays a key role in agricultural development and income distribution through resource allocation. The major policy elements of agricultural incentives include regulating the support and release prices for outputs, input subsidies, import and export duties, and setting regulations and institutions that encourage or discourage the production, consumption and export of a particular commodity.

The agricultural price policy was actualized in the decade of the sixties when the government began to view agricultural prices as a major element in its strategy for economic development. This advance was primarily as a consequence of the change that had come about in the outlook of the economists and policy-makers about the proper role of agriculture in economic growth, and it reflected the strongly held view that producer prices played a decisive role in production, consumption and marketing decisions of

farmers. The establishment of the Agricultural Prices Commission in the seventies was perhaps the most significant institutional expression of this changed outlook.

The specific form price interventions take every year vary from commodity to commodity and depend on the circumstances of an individual commodity. Of these several prices, minimum export price can change even from day to day in response to international developments but in theory at least support prices (minimum prices) for phutti and lint are expected to stay constant throughout a season. The fact of the matter however is that even if support prices for phutti, the prices which are relevant to growers, remain the same throughout the year lint prices are quite often raised by government under pressure from ginneries when international prices show an upward trend. Complaints are also heard widely that in periods of falling prices small farmers at least find it rather difficult to sell their output at official procurement prices. Cotton price policy is thus exceedingly complex and difficult to administer and its actual operations rarely conform to its announced intentions. It appears that the government of Pakistan has, over time assumed such daunting responsibilities towards the management of cotton prices and cotton export which very few governments, even those which possess far greater administrative resources than Pakistan, would willingly undertake. It is therefore not surprising that cotton hits the headlines as often as it does in Pakistan.

The price regime for wheat has its own characteristic complexities. For wheat, government announces two prices but does not yet recognize quality differentials: the procurement price at which it is willing to buy any amount of wheat offered to it by the farmers and the issue price at which government stocks are released to flour mills. The former is designed to protect the grower against decline in prices particularly at harvest time, to stabilize farmer's incomes over time and to provide growers with incentives to maintain and increase production; the latter being a subsidized price serves consumer interest. Both these prices are expected to remain constant in a wheat year; in fact government undertakes to defend, if necessary through imports, the retail prices that emerge as a result of the operation of the issue price regime. It should also be observed that generally issue price remains very close to support price throughout the year because it absorbs all or most of the storage and transport costs of government operations in wheat. In the course of this decade, for example, issue price was lower than support price well until 1987-88 but in 1988-89, after the abolition of the rationing system, release price was 1.79% and in 1989-90 about 8% higher than the procurement price. It may well be that for political and social reasons government could not perhaps set

the issue price at a very much higher level than the support price so soon after the dismantling of the rationing system but it is also true that a narrow band between the two prices has very powerful implications both for government budget and for private investment in storage and transportation of wheat. For example, last year, federal and provincial governments total wheat subsidies were more than Rs. 8 billion when on average these were no more than about Rs. 3.5 billion per annum in the years of rationing. It is also important to observe that, in contrast to the official announcements, support prices in fact generally act only as reference prices and that actual transactions more often than not take place within a band around these prices rather than at the single fixed procurement price. Part of the reason for this divergence lies in the fact that government does not yet operate objectively defined price premia for quality differentials which has given rise to serious malpractice. It is also reasonable to assume that small farmers who do not have the financial capacity to withhold sales in periods of low market prices or who have limited bargaining power in relation to their traditional/contractual buyers are unlikely to receive official prices. Even in the case of wheat and wheat flour, retail prices vary from city to city and month to month.

In the case of onions and potatoes, the government began to announce support prices from 1976-77 but both PASSCO and AMSL suffered such heavy losses in the earlier years of their operations that minimum prices ceased to be anything more than mere symbolic prices. The ineffectiveness of their current interventions can be gathered from the fact that the seasonal index of wholesale prices still swings between 71 in January to 136 in November for potatoes and 72 in March to 132 in November for onions. In other words, procurement operations relating to onions and potatoes are neither protecting producers incentives nor are they having any noticeable effect on price stability.

The nominal rates of protection which compare domestic to border prices adjusted for transport and other marketing costs and evaluated at the official exchange rate have recently (1987) been estimated by Paul Dorosh. These calculations show that between 1961-87:

- 1 NRP for wheat worked out on the basis of import parity prices is minus 0.11, but plus 0.46 when export parities are used as reference prices. It is useful to make both these calculations because Pakistan has been both an exporter and importer of wheat. Presently it is simultaneously an exporter and importer of wheat. It is well known that as a result of consumer price differentials a substantial amount

of wheat moves into Afghanistan illegally. Data also show that since 1976-77, Pakistan did not import wheat only in two years; FY 1982 and FY 1983. Pakistan can therefore be legitimately regarded as an importer.

- 2 Export parity price based NRP for Basmati (Paddy) since 1964 has been consistently negative. On average, it was minus 0.41. For Irri (Paddy) on the other hand, NRP has fluctuated from decade to decade; it was positive in the sixties and the eighties and fairly strongly negative in the seventies. On average between 1961-87 however it was minus 0.06.
- 3 The average nominal rate of protection for cotton(phutti), for the period 1961-87 was positive at 0.21 though minus 0.15 for the short period of 1972-77.
- 4 NRP for sugar (ex-will) was 62.04 and for sugar cane 152.86. This rate for sugar cane in 1983-87 was as high as 627.75.
- 5 NRP for vegetable oil, which for balance of payments reasons at least requires strong protection, in fact received negative discrimination; that is to say, domestic prices were lower than import parity prices. On average for 1961-87 NRP for vegetable oils was only 0.06. Domestic prices of fertilizer have also been lower than import parity prices since 1972. Between 1972 to 87, N.R.P for fertilizer ranged over minus 0.18 to minus 0.36.

In general, the pattern of effective rates of protection is similar to that of nominal rates since traded input costs are small for most of these commodities. It is however interesting to observe that for the period 61-87, effective rate of protection for sugar cane was plus 3.71 and for cotton 0.61 compared with N.R.Ps estimated at plus 152 and plus 0.26 respectively.

These estimates of nominal rates of protection show that support prices for seed cotton, the single most important export of Pakistan, have been quite often higher than export parity prices. On the other hand, in the period 1964-87, support prices for basmati have been only approximately 60% of the export parity prices; in other words, this second major agricultural export of Pakistan has suffered heavy negative discrimination. Vegetable oils, a major import, which strictly speaking should have received substantial protection to encourage domestic production and to reduce dependence on imports were

left uncared as policy focussed mainly on the level of prices relevant only to consumers. But sugarcane on the other hand received massive protection in the same period; in fact, the level of N.R.P for sugar cane brings out the interesting point that in Pakistan manufactured goods were not the only products that depended on high protective walls for their existence or development; even an agricultural product like sugarcane also received substantial protection to grow. In the case of wheat however the situation is rather ambiguous. Compared with import parity prices, procurement prices have always been low since 1972 except for two recent years, 1987 and 88. On the other hand export parity and procurement prices have stayed close to each other since 1978 except in the three years beginning from 1985 when export prices distinctly fell below procurement prices. This survey suggests that procurement prices have generally provided positive rates of protection for wheat and cotton with reference to export parities, negative protection for rice with reference export parity and negative protection for vegetable oil seeds with reference to import parities.

It is also true that on the whole agricultural output prices in Pakistan have been less unstable than prices in international markets. For example, the World Bank Economic Review in its September, 1988 issue has reported that in Pakistan the ratio of standard deviations of deflated producer and deflated border prices for cotton and wheat for the period 1960-84 has been less than one which indicates that real domestic producer price fluctuations were smaller than real border price fluctuations. This ratio in the case of cotton is 0.62 and for wheat 0.17. The estimates of co-efficient of variation of producer prices made by Paul Dorosh (1988) also confirm that support price policy of Pakistan did limit fluctuations in commodity prices. This was clearly desirable because violent fluctuations in output prices not only adversely affect private savings and investment decisions but also produce unintended effects on the quantum of credit required for government commodity operations which only exacerbates instability in the government budget.

A recent study prepared by Dr. Mubarak Ali (1988) on supply response of major crops, which takes full account of inter-dependence among crops, has estimated that food crops have relatively low long run own-price elasticities, while cash crops like cotton, on the other hand, have high own-price elasticities but they also have relatively high negative cross-price elasticities: the elasticities for wheat and maize are just 0.33 and 0.36 while cotton has a long-run supply elasticity as high as 1.34. On the other hand, negative cross-price elasticities of cotton for wheat, rice and sugar cane are also as much as 0.22, 0.46 and 0.23. In other words, raising food crop prices have limited production

effect and though cotton does respond to higher prices increase in its production will to a significant extent be at the expense of other crops. Dr. Mubarak Ali's study has also estimated that a 10% increase in the support price of all the five major commodities; namely, wheat, cotton, rice, sugarcane and maize will increase total output by 6% but the extent of increase in the real income of producers will depend on the behavior of the general price level in response to support price increases. In other words, given these price elasticities of supply, agricultural support prices have been a necessary but not a sufficient condition of growth, though it has also to be pointed out that new technologies could not have made much headway in an environment of adverse output/input ratios and low profits.

In summary, until the mid sixties, important features of the government price policy were: fixed low retail prices for consumers which translated into low prices for producers; heavy export duties on cotton; regional restrictions on movement of agricultural commodities which meant low prices for producers in surplus producing areas; monopoly procurement of wheat and rice; proceeds from the agricultural exports were converted at an overvalued fixed exchange rate (implicit exchange tax on agricultural exports from 1960-71 averaged 89 percent); and the government freely accepted the agricultural commodity imports at concessional prices which resulted in depressed domestic prices. The shortages in food supplies and the accompanying balance of payments problems during the late 1960's and early 1970's forced a reconsideration of the government policies in favor of agriculture. The shift of policy coincided with the availability of high yielding varieties of wheat and rice in the late 1960's.

Price support measures in the sixties and the seventies did however improve and played an important role in sustaining growth in agricultural production. Important features of current price support policy are: government's readiness to purchase at support prices; shielding the producers from extreme fluctuations in the international prices thus imparting a measure of stability to the domestic commodity markets; increasing productivity and containing the production costs; and reassuring the producers that they would be compensated for unavoidable inflationary pressures, reduced subsidies on farm inputs and a relatively closer relationship with longer term international commodity price trends.

As SHown, agriculture's net barter terms of trade (the ratio of prices received to prices paid by agriculture) remained adverse through most of the fifties which resulted in a transfer of resources out of agriculture into industries and

to the urban consumers. The sixties and the seventies however witnessed a distinct improvement for agriculture though for some brief periods in these two decades such as 1968 to 1972 agricultures' terms of trade declined once again. The eighties on the other hand have been an unambiguously negative period primarily as a result of removal or reduction of subsidies on farm inputs. On the whole however between 1951-52 to 1985-86 agricultures' terms of trade do not show any strong tendency in either direction.

**Crop Production, Performance and Prospects:** Farm production is dominated by crop production which accounts for almost 69 percent of agriculture's GDP. There are five major crops, namely wheat, rice, cotton, sugarcane and maize.

Beginning from FY 1947, the cropping sector of Pakistan has grown at more than 3% annually. In the case of wheat and cotton, growth came primarily from increase in yields; in the case of sugar cane, onions, potatoes and other vegetables it was increase in area which generated most of the expansion while rice production rose as a result of more or less equal increase in area and yields. Gram suffered a decline both in area and yield while mung, bajra, jowar, barley, rapeseed and mustard lost only in area. Maize gained in area but the growth of its yield lagged behind other major crops.

Although the cropping sector as a whole and some individual crops in the past did experience remarkable growth rates, from the mid-1980s, except for cotton (and basmati in 1989) in the Punjab, rates of increase in yields have either slowed as in the case of wheat or become constant. In the case of wheat in particular, growth in yield has been affected, among other things, because varieties of seed suitable for late planting in cotton/wheat and rice/wheat cycles have not yet been developed. On the whole, average yields of almost all crops are low compared with international standards as well as relative to what has already been achieved in the country by progressive farmers. It is also well known that if proper agronomic practices are adopted and inputs are applied at proper time and in proper proportion, average farm productivity can improve by at least 15-20%.

The expansion of cropped area has also slowed down in the recent past as a result of decline in the growth of water supplies. At the same time the rate of increase of area sown more than once has also fallen. Between 1947 and 1977 cultivated area increased at the rate of 0.91% and in the period 1965-87 irrigation water at the rate of 2.42%. In the eighties however this process slowed down to 0.32% and 1.6% and consequently conflicts between crops which in the past could be resolved through expansion of physical resources have now come to the surface. The fact of the matter is that Pakistan being

a country which covers a wide range of longitudes produces a vast array of crops such as cereals, pulses, forages, fruits and vegetables and cash crops like cotton, tobacco, sugar cane, and that virtually all of these crops compete for resources directly or indirectly. For example, even though wheat is the single most important winter crop, maize, sugar cane and several others substitute for it directly and its yields are strongly affected by crops which precede it. Sugar cane which is a 12-18 month crop displaces both wheat/cotton and wheat/rice. A great deal of expansion in area under wheat and cotton has also come about at the expense of oil seeds and pulses including gram. It is clear that competition becomes more acute as resources come under strain and their growth falters. A new and more workable balance has therefore to be struck between horizontal and vertical expansion of the cropping sector to clear the way for effective action in the future.

The historic changes in the share of various crops in the total cropped area portrayed in the following table.

Average Annual Growth Rate in Area, Yield and Production of Major Crops During 1947-88. (see table 9)

On the whole, the share of all Foods has remained more or less constant during the last four decades. But it is striking that the share of major crops like wheat, rice, sugarcane and cotton increased along with some gains for onions and potatoes, while the share of other crops either remained constant or declined.

Table 9 % Per Year Growth Rate In

Crops	Area	Yield	Production
Wheat	1.68	2.35	4.02
Rice	2.35	2.17	4.52
Sugaarcane	3.79	0.74	4.53
Cotton	1.94	2.21	.14
Maize	2.10	0.82	2.92
Gram	-0.26	-0.36	-0.62
Tobacco	2.10	0.30	2.40
Mash	1.59	0.95	2.55
Mung	-0.08	0.95	0.87
Masoor	0.07	-0.16	-0.11
Other Pulses	2.78	0.36	3.14
Bajra	-1.83	0.70	-1.13
Jowar	0.65	0.72	0.07
Barley	-0.10	0.42	0.32
Onion	5.10	0.88	6.21
Potato	6.41	0.6	7.32
Other Vegetables	1.46	2.33	3.79
Rapseed & Mustard	-0.82	1.65	0.82
Sesamum	0.80	1.38	2.19
All Foods	1.37	2.35	3.73

This finding confirms that major crops remained the focus of government policy and technological developments as a result of which they gained in comparison to others.

Average Annual Growth Rate in Area, Yield and Production of Major Crops During 1980-88. (see table 10)

Despite the rapid increase in fertilizer offtake, the efficiency of fertilizer use has been poor and average response ratios have been well below potential. Other than poor extension service, there is no well developed scientific procedure for developing fertilizer recommendations for the farmers in different ecological zones. Although, the fertilizer distribution network is well established, there have been reports of localized shortages at critical times.



structure continue to impede the achievement of durable food security. The Area Share Under Different Crops During 1947-70, 1970-80, and 1980-88. (see table 11)

Production of wheat has generally lagged behind the growth of demand and substantial amounts have had to be imported specially in the eighties to meet the deficits. These recent developments were due primarily to decline in the rate of increase of wheat yields to about 2% compared with 2.6% of the earlier decades and fall in the rate of expansion of its area. The supplies of milk and milk equivalents which constitute almost one third of total food consumption have also had to be augmented every year in the current decade although this has so far been due more to the existence of seasonal and/or specific local shortages than to an overall deficit. The share of imported vegetable oils in total consumption has increased from 65% in 1980 to 78% in 1988 partly because consumption of vegetable ghee increased rapidly and partly because area under traditional oil seeds crops shifted to other crops and yields increased only slowly. Growth of pulses which together with wheat are an indispensable source of proteins for the poor have suffered for lack of technological innovation and varietal improvement. Sugar cane, the base for a major import substitution product, has indeed developed primarily by substituting for other crops.

Together with somewhat of a fragile food security, the export potential of non-traditional products of Pakistan has also remained unexploited. Of the two major export products, cotton production made considerable headway recently in Punjab but this experience has yet to be replicated in Sind where yields are stagnating. The major problems that still continue to affect production of exportable rice are first, labor shortages at transplanting time which delays the crop and results in less than optimum plant population, and second, shift to sodic soils. High post harvest losses also reduce the amount available for marketing.

At the same time, production of non-traditional products such as vegetables and fruits must also increase substantially so that their export potential can be exploited on a long term basis. Most of the seed required for these high value export crops (fruits and vegetables) are presently being imported without sufficient regard to their suitability to local conditions while domestic seed production and distribution systems are extremely poor. A post-harvest marketing system which could meet the requirements of international markets has also yet to be developed. And worst of all, government policies with regard to export of fruits and vegetables have been rather erratic which

strongly discouraged systematic effort by the private sector to invest in the exploitation of foreign export markets. A stable policy framework for the development of these exports is therefore now indispensable.

TABLE 11

Crops	1947-70	1970-80	1980-88
Wheat	24.16	25.06	26.49
Rice	5.70	6.83	7.08
Sugarcane	1.90	2.75	3.08
Cotton	7.04	7.73	8.41
Maiz	2.34	2.59	2.89
Gram	5.59	4.28	3.42
Tobacco	0.19	0.20	0.16
Mash	0.20	0.20	0.24
Mung	0.39	0.27	0.28
Masoor	0.30	0.32	0.22
Other Pulses	0.96	1.76	1.47
Bajra	4.34	2.64	1.77
Jowar	2.56	2.00	1.38
Barley	0.94	0.70	0.72
Onion	0.07	0.12	0.15
Potato	0.06	0.11	0.17
Other Vegetables	0.52	0.48	0.49
Rapseed & Mustard	1.96	1.11	
Sesamum	0.14	0.14	0.11
All Foods	40.05	39.85	40.34

In the past feed including maize and oil cakes for livestock suffered because of slow expansion in cultivated areas, lack of systematic research efforts to develop high yielding varieties and the absence of incentives for the private sector to produce and sell high yielding varieties. Conflict between fodder and other crops for area has to be resolved through technological development, and varietal improvement rather than displacement of other important crops.

Relatively slow development of barani areas has always been a major factor behind the instability of food. These areas have not yet experienced any major technological improvement; in fact production of pulses like gram and masoor which are grown mainly in these areas have suffered a significant decline. On the whole, production in barani areas is still highly vulnerable to fluctuations in weather which only adds to uncertainty in the achievement of the national

objective of food security. The past imbalance in investments, research and extension services between irrigated and barani areas needs to be reduced to promote more even development in the country.

The two major constraints on more rapid development of the food and fibre system have been the recent slow down in the rate of increase of irrigation water and cultivated area and the piecemeal decision-making by the government. The Food and Fibre system, (comprises farming and agribusinesses) concerned with inputs and outputs of the agricultural sector constitutes complex inter-dependent complex of activities. Policies affecting farming and agribusinesses are however presently being made piecemeal with the result that the effects of a decision relating to one of its constituent elements on the working of the rest of the system are quite often not fully taken into account. At the same time, not all economic agents active in food and fibre system are always consulted formally before making decisions affecting them. Given the growing complexity of the food and fibre system, it is essential that institutional arrangements are put in place within the government, for making more efficient and equitable choices, ensuring greater consistency of agricultural policy with national objectives and achieving greater coherence within a policy. The pricing policy also needs to be placed in a more coherent framework by articulating more clearly the changes being sought in relative prices of various crops, the ratios of output-input prices and the relationships between domestic and international prices.

**Wheat:** Wheat is the leading food grain in Pakistan. A high percentage (about 79 percent) of the total wheat crop is irrigated. Its share in total cropped area has increased from 32.7 percent in 1960 to 36.97 percent in 1988-89. During 1947 to 1988, area, production and yield grew at an average annual rate of 1.68, 4.02 and 2.3 percent respectively. The share of area under wheat in this period increased at the average annual rate of 0.31%. Wheat production has increased dramatically since mid sixties, mainly as a result of yield increases. Increases in yield were realized through the adoption of high-yielding disease resistant varieties. Presently, almost all of the irrigated wheat and, at least half of the barani wheat is under the high-yielding varieties. In 1988-89, the area under wheat was 7727 thousand hectares, while the average yield was 1,859 kg/ha. The rate of increase of yield of wheat has however slowed down in the eighties to 2% compared with 2.65% in the earlier decades.

Self sufficiency in wheat can be achieved and sustained only if wheat yields can be increased beyond past trends. This can be done by bringing more area under certified wheat seed. Presently, only 10 percent of the area is being

sown with certified wheat seed against a 20 percent required replacement rate. Further increases in yield can be realized through improved cultural practices, greater attention to tillage and harvesting operations, more balanced and timely use of fertilizer, and high water use efficiency. Yield levels in barani areas are exceptionally low but possibilities for increasing yields in these areas have not yet been tapped. Special attention therefore needs to be given to technology generation and dissemination for rain-fed areas with particular focus to the development of appropriate tillage and planting equipment. The wheat varietal evolution research program will also have to place greater emphasis on disease resistance, late planting and short duration varieties and varieties suited for stress environments.

It has been observed that labor shortages at transplanting time usually delay the crop and result in less than optimum plant production. Poor agronomic practices and fertilizer shortage at a critical stage of the crop have also kept the yield level well below international standards. Presently rice cultivation has

Figure 10

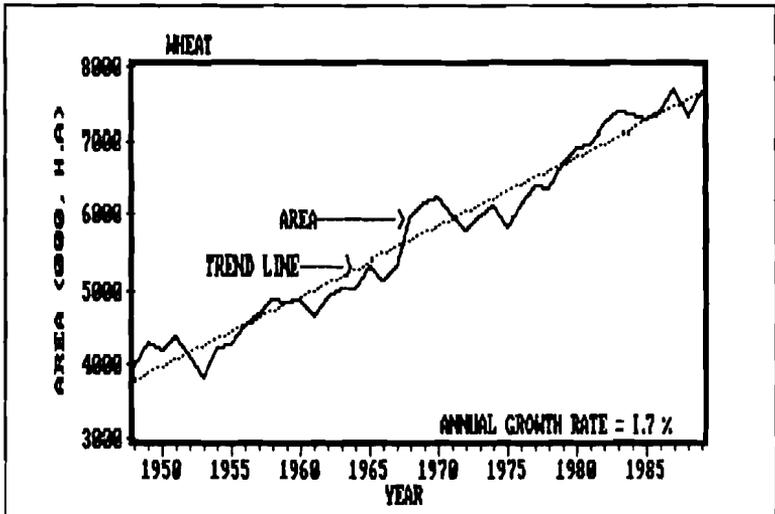
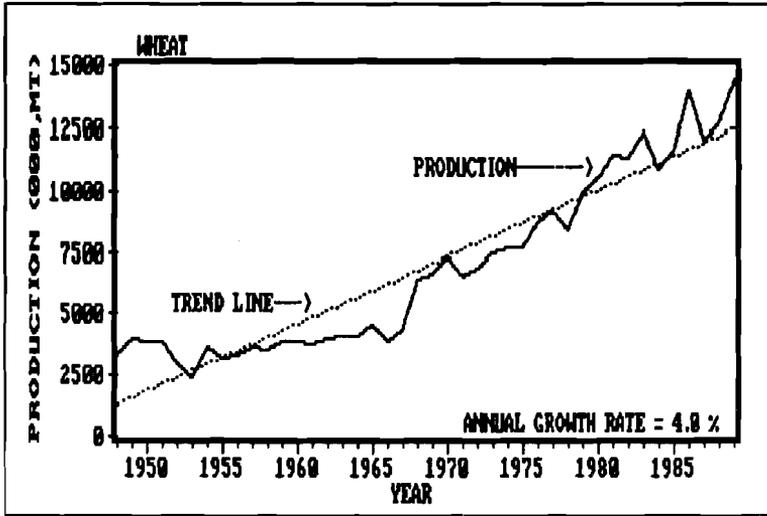


Figure 11 WHEAT: PRODUCTION

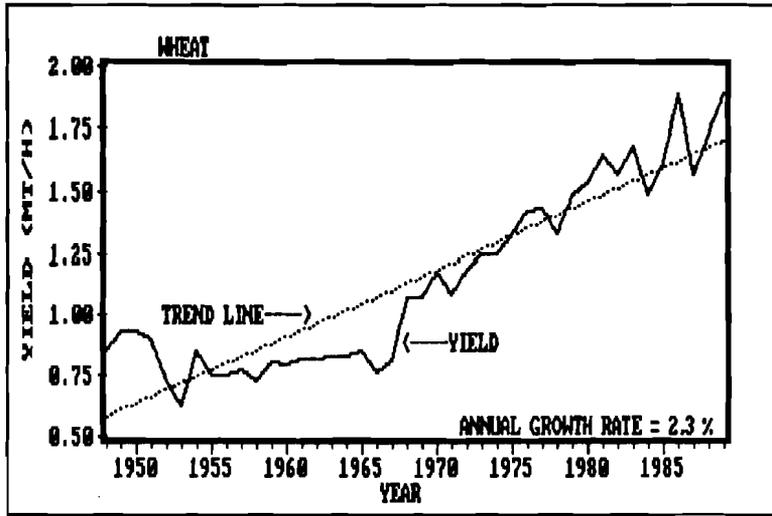


been pushed on to sodic soils which also affects the yield. At the same time post-harvest losses are high particularly in Sind which reduces the total availability of rice in the country. These are however problems that can be remedied without much difficulty.

Pakistan appears to have a comparative advantage in producing the highly desired aromatic basmati rice. Basmati has been a major export of Pakistan which also generates substantial revenues for the government of Pakistan through export duties. The government has adopted a number of policy measures to promote larger production of Basmati. The compulsory procurement of Basmati rice and restrictions on its movements have been discontinued. The support price has been increased and the private sector is being encouraged to export packaged rice, in competition with RECP.

However basmati is now faced with a serious challenge from India, Thailand and the United States in its traditional export markets and the government will have to pay much greater attention than ever before to its problems to enhance its production and maintain its international competitiveness. The private sector will be given strong encouragement to

Figure 12 WHEAT:YIELD



develop mechanized transplanter and threshing services to meet labor shortages, preserve quality of output, reduce harvest losses. Effort will also have to be made to popularize the application of zinc on sodic soils.

In the past, increases in wheat production in Punjab came from three main sources: increase in cropping intensity, conversion of rainfed to irrigated areas, and increase in yields due to High Yielding Varieties and use of fertilizer. But a recent study has now shown that these sources of growth are likely to play a much smaller role in the future: "only increased area expansion from higher cropping will be significant. Fertilizer dosage will increase but the marginal pay-off is now relatively low under current production practices. The emphasis in Pakistan on boosting yields through higher levels of inputs must change to one of promoting greater efficiency of using inputs at their current levels".

**Rice:** Rice is the second most important crop. Two major rice growing provinces are Punjab and Sind which accounted for 54 and 36 percent respectively of the area planted. Basmati rice, a high valued export crop and a foreign exchange earner, is grown in the Punjab. The average annual growth rate of area, production and yield for the period 1947-88 was 2.35, 4.5 and 2.17

Figure 13 RICE: YIELD

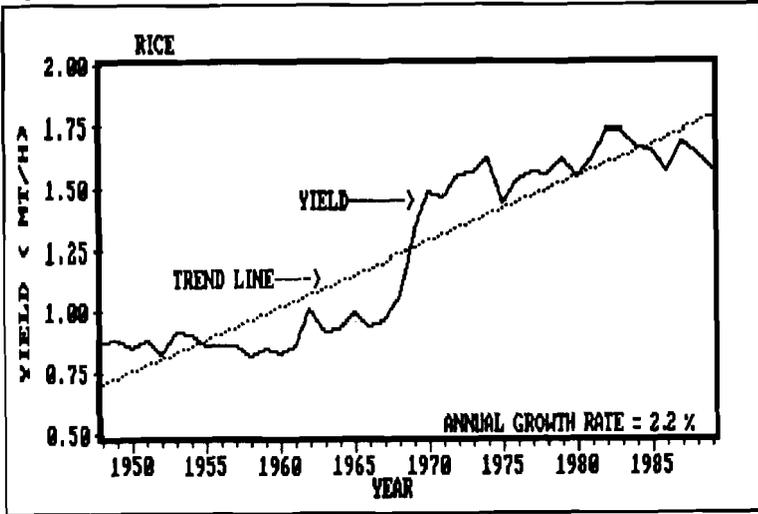
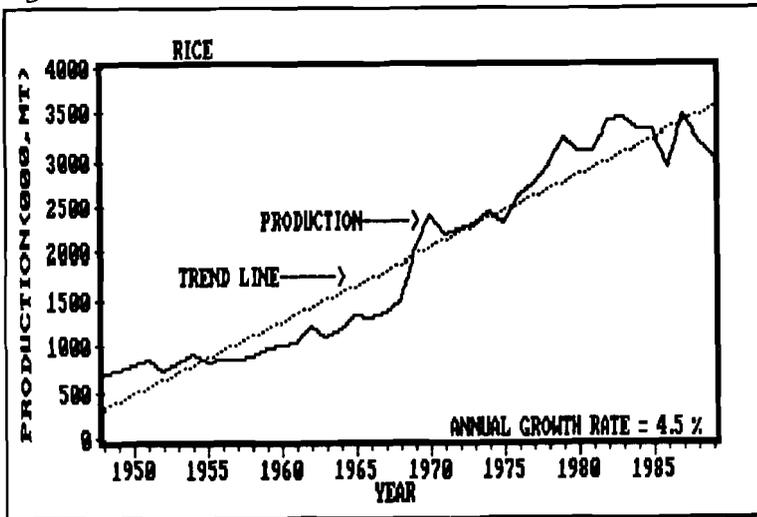
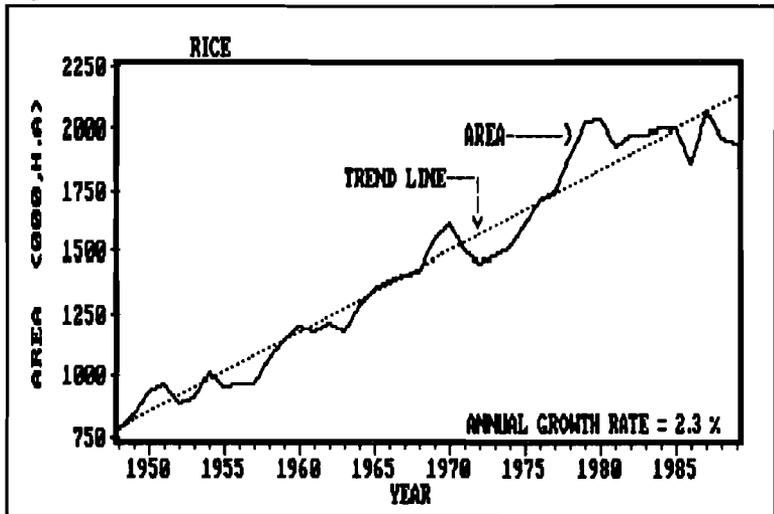


Figure 14 RICE: PRODUCTION



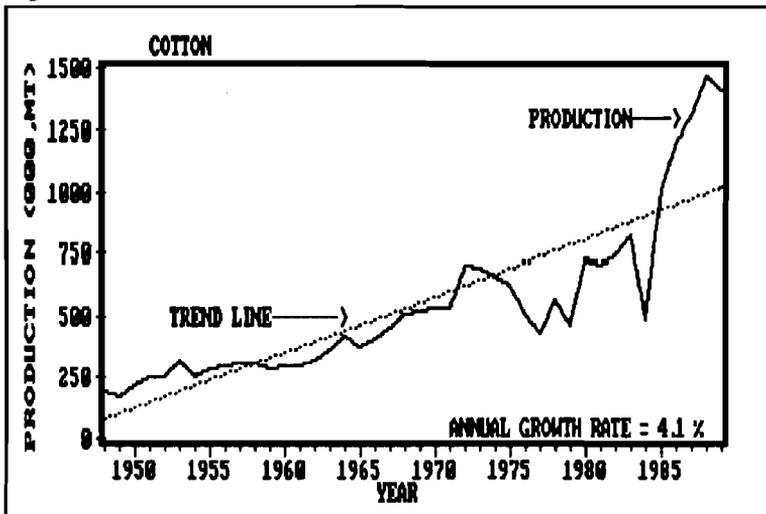
percent respectively. Since the mid-1970s, overall growth in rice production has been much slower than for wheat. Yield improvements, which are generally the result of adoption of improved technology and intensive use of inputs, have only contributed 23 percent to the increase in rice production between 1970 and 1982, which is in contrast to 66 percent for wheat. At the same time the rate of increase in the yield of rice, like that of wheat, slowed down in the eighties. In 1988-89, area under rice was 2,042 thousand hectares while average yield was 1,567 kg/ha.

Figure 15 RICE: AREA



**Cotton:** Cotton occupies the second largest area (after wheat) of all crops grown in Pakistan. It is the most important non-food crop and earns the largest export revenues. In addition to the lint, cottonseed for oil and meal, accounts for 80 percent of the national oilseed production. Approximately, 70 percent of the cotton growing area is in Punjab while most of the remainder is in Sind. Area, production and yield grew at an average annual rate of 1.94, 4.14 and 2.21 percent respectively, during the period 1947-88. In 1988-89, area under cotton was 2,619 thousand hectares while yield was 544.5 kg/ha (lint).

Figure 16 COTTON PRODUCTION



Cotton production grew at a faster rate than rice production between 1970 and 1982. Yield increases contributed almost 70 percent to overall increase in cotton output during this period. Historically, cotton production showed a cyclical pattern. Absence of long term price support policy, poor weather and pest attacks were some of the factors responsible for this instability. The disastrous cotton failure in 1983-84 resulted in an increasing use of chemicals and pesticides. Consequently, cotton output increased from a low level of 2.9 million bales in 1983-84, to 5.9 million bales in 1984-85, 7.2 million bales in 1985-86 and to a record 8.385 million bales in 1988-89. Improved seed varieties also played a critical role in enhancing cotton yields.

The results achieved in Punjab have not been replicated in Sind, where yields have stagnated. Non availability of good quality seed, higher incidence of water logging, shift of good cotton areas to sugarcane, and absence of proper plant protection measures are the major reasons for stagnation in yield. A wide variation in cotton prices in the international markets compels Pakistan not to closely follow international prices in fixing domestic support prices. However, Pakistan is an efficient producer of cotton, and it can therefore ordinarily produce cotton at prices equal to or lower than

Figure 17 COTTON AREA

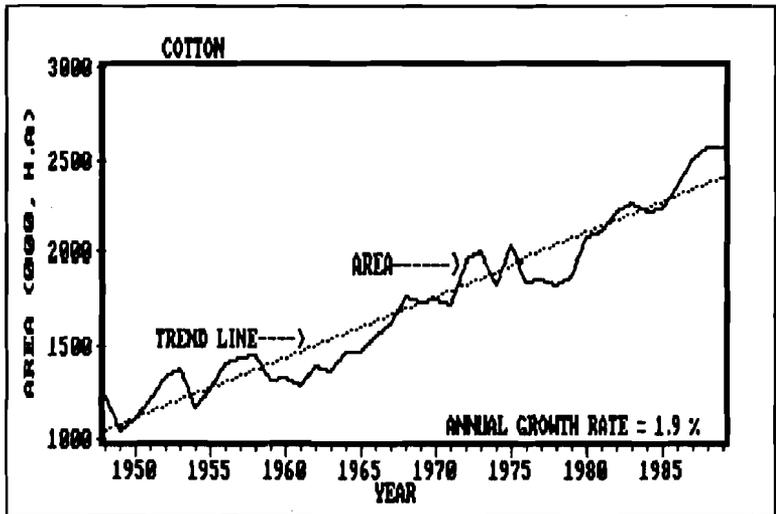
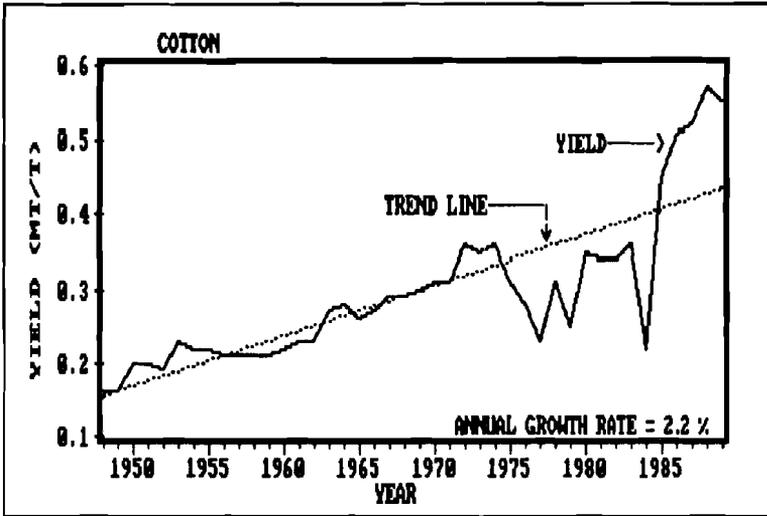


Figure 18 COTTON: YIELD



international long trend prices except in abnormal years of glut or high subsidies by other producing countries. In such years, the government has to protect the farmers through subsidies.

Given the difference between yields abroad and those obtained in Pakistan, and the yield gaps within Pakistan, it is clear that Pakistan has a long way to go to realize its full potential. For example it is essential that research and extension services relating to cotton be strengthened throughout the country but specially in Sind to replicate the experience of the Punjab. Pest Scouting and Warning Services also need to be started in Sind and improved in Punjab.

**Sugarcane:** Sugarcane is an important cash crop in Pakistan. Punjab is the main growing area, followed by Sind and NWFP. Area, production and yield grew at an average annual rate of 3.79, 4.53 and 0.74 percent respectively in between 1947-88. Production increases were realized mainly as a result of an expansion in acreage, since yields have increased only slightly. Sugarcane area has expanded considerably, particularly in Sind. In 1988-89, area under sugarcane was 877 thousand hectares while average yield was about 42.16 tons/ha. The average yields in Pakistan are considerably less than obtained in

many other countries such as India (53 tons/ha) and Egypt (83 tons/ha). On the evidence of yields realized by the progressive farmers the yield gap of the existing varieties is estimated at about 50 percent. Sugarcane has experienced very little varietal improvement over the years. A basic constraint is that sugarcane does not produce viable seed in the Indus plains. Another problem is the limited area available with research stations for breeding, replication experiments and seed multiplication. Also, there have been few improvements in the agronomic practices. Since water requirements for this crop are very high, stress levels are relatively serious in Punjab. Future increases depend critically on the efficiency of farm-to-mill delivery system, mill efficiency, price structure, payment procedures adapted by mills, and crushing and recovery capacity of country cane crushers (Lodhi, Kamil, October 1988).

Figure 19 SUGARCANE AREA

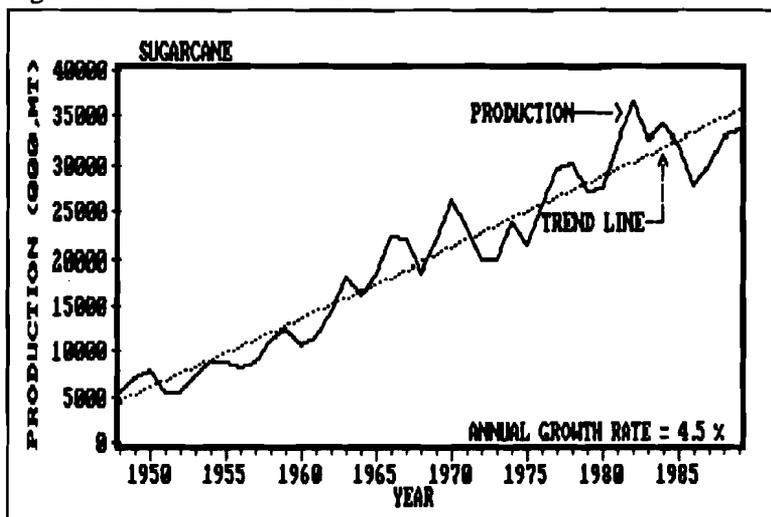
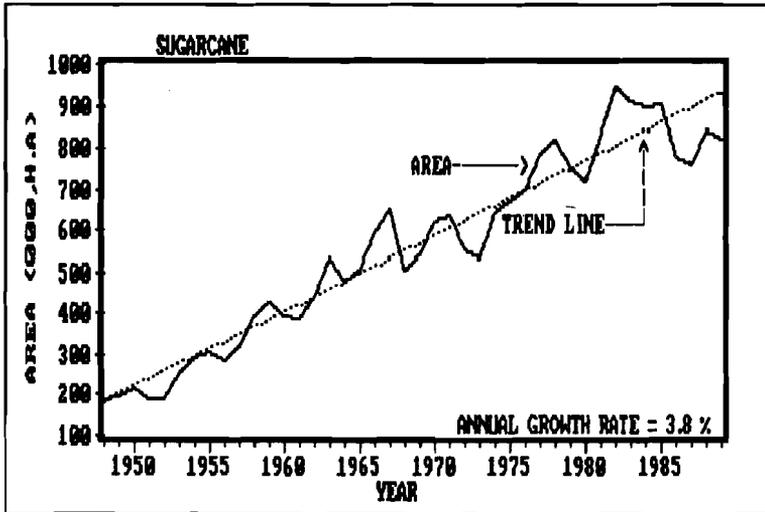


Figure 20 SUGARCANE AREA



**Maize:** Maize is grown under both irrigated and rainfed areas. NWFP leads in maize production, both in area and yield, followed by the Punjab. Area and production grew at an average annual rate of 2.10 and 2.92 percent respectively during 1947-88. Yields of maize have been low by world standards, averaging only 1.28 tons/ha in the last five years. The hybrid varieties, so successfully adopted in many countries, were tried in the early 1970s, but there was limited adoption. Most production is for grains, although some is grown specifically to provide green feed to milk animals.

Only a small amount of this crop is processed to produce edible oil, as it takes up to 78 ha under maize to produce enough shelled grain for one metric ton of oil. Low yields, government pricing policies, and consumer preference for other food grains are the main reasons for low popularity of maize. Its possible role as a livestock and poultry feed also does not appear to be widely perceived. The problem of low yields needs to be tackled by concentrating breeding research on the development of cold resistant varieties for growth at high altitudes where very few alternative crops can be promoted. Simultaneously the private sector can be encouraged to develop and spread

hybrid maize seed.

**Oilseeds:** The production of oilseeds has almost remained stagnant for many years despite the fact that demand for vegetable ghee (extracted from oilseeds) has doubled within a decade, from 1978 to 1988. During 1947-88, area under traditional oilseeds like rapeseed and mustard declined at the annual rate of 0.82% but production increased annually by about 0.82% because of an improvement in yields at the rate of 1.65%. In the period 1980-88 however both area and production of these oilseeds declined at the rates of 5.38% and 2.32% though the availability of cotton seed did increase in these years as a result of rapid growth of seed cotton. In fact cotton seed, which has always been the major domestic source of edible oil, doubled its production between 1980-88. Consequently, the share of cotton seed oil in domestic production has further increased, while that of rapeseed and mustard has declined. At the same time the share of non-traditional oil seeds like sunflower and soybean has improved somewhat as a result of promotional activities of the Ghee Corporation.

In contrast, in the past, demand for vegetable oils grew at an unusually high rate, approximately 10 to 11%, because of a rising population growth rate, increased incomes, declining real prices of vegetable ghee and as a result of substitution of desi ghee. In the future however the rate of increase in the demand for oil seeds is expected to decline substantially as the process of substitution of desi ghee completes itself. Future growth in demand is therefore likely to depend on its normal determinants.

Over the years domestic production has generally been about one fourth of the annual consumption. Consequently, given the present gap between production and consumption, vegetable oils, mainly palm oil, are now the single largest food import of Pakistan. For instance, in 1988-89 alone almost half a billion dollars had to be spent on imports and there is no reason to believe that the volume of imports will decline in the near future.

The fact of the matter is that no major campaign has ever been launched to develop these crops either through price incentives or technological development. Research has been limited and too thinly spread over a large number of institutions. The Ghee Corporation of Pakistan, the dominant oil refining government owned industry, does make some effort to promote the development of oilseeds by supplying inputs to growers and procuring their produce and through dissemination of improved technology. But these programmes need to be strengthened substantially if progress is to be made

in this important area.

Since average yields on farms are astonishing low compared with the results obtained on experimental stations, production of oil seeds can be increased sharply through policy measures and technological developments. It is argued that, when technology and inputs are available, non-traditional oilseeds like sunflower, and safflower, can profitably replace the late wheat, in cotton and basmati rice zones. Seeds can also be grown profitably on fallow lands after wheat especially in barani areas.

The domestic production of oil seeds can not however be increased without a significant change in government policies regarding producer and consumer prices. It is essential that, like other import substitution activities, production of oil seeds and their processing into vegetable ghee is given adequate protection in order to staunch the outflow of large quantities of foreign exchange. Given relatively low prices of oils abroad and low administered retail ghee prices within the country, there is little incentive for the industry to promote relatively high cost oil seed production. The government has already initiated the process of raising prices of domestic oilseeds for the Ghee Corporation of Pakistan and of vegetable ghee for consumers, but the pace of this adjustment needs to be stepped up to achieve meaningful results. A new relative price regime will enhance the profitability of oil seed growing, reverse the tendency towards area substitution and at the same time reduce illegal exports to neighboring countries. Finally, it may be added that in pursuit of these objectives it may also become necessary for the government to begin privatization of its large vegetable ghee making industry to provide room for market forces that will allow for modernization of this major industry and improve its performance.

**Course Grains and Pulses:** The relative importance of course grains in consumption has declined over time as tastes are changed and per capita incomes have increased. However grains like sorghum, millet and barley constitute a major feed and fodder source and their importance will increase further if the poultry sector continues to expand at its present rapid rate.

Gram, which takes about two-thirds of the total acreage under pulses, is a major crop in the farming system of Pakistan. During 1947-88, average annual growth rates of area, production and yield of gram were all negative: 0.26% for area, 0.62% for production and 0.36% for yield. In the eighties however these rates were either constant or positive. The old practice of inter-cropping of gram with wheat has now been discontinued because farmers do not want to put their relatively high value wheat crop at risk. On the whole, the

performance of gram has been rather poor despite the fact that its wholesale and retail prices rose almost ten times during the last twenty years. Its yield is also very vulnerable to the blight caused by heavy rains before harvesting. Basically the failure of this crop to develop is due mainly to stagnant technology.

The yield of mong, mash and other pulses have decreased overtime. Recently these crops suffered a serious set back due to ineffective weeds and pest control. The prices of these crops have increased by more than five times during 1971-89 but production did not respond as these crops did not experience any technological break through in the last thirty years.

Punjab is the major pulses growing area followed by Sind, NWFP, and Baluchistan. With the changes in production patterns in Punjab, the pulses and minor crops areas have been shifted to major crops.

Pulses are still a major source of proteins for the poor. Consequently an increase in the rate of growth of production of pulses is a matter of considerable social importance. Emphasis is required in the areas of development of improved and disease resistant varieties of pulses and coarse grain crops. Simultaneously, new pulse growing areas in Baluchistan and NWFP will have to be explored to offset losses of area in other provinces.

**Fruits and Vegetables:** Fruits and vegetables represent a fairly dynamic segment of Pakistans farming. For example, between 1975-76 and 1987-88 area under fruits and their production increased by about 80% and 70% respectively and that of vegetables (excluding potatoes and beet sugar) by 60% and 65%. In 1987/88 itself, area under fruits and vegetables was 0.6 million hectares out of a total cropped area of 20.90 million : fruits had 0.427 and vegetables 0.192 thousand hectares. Fruits and vegetables have also now proved themselves to be a promising export. It has been estimated that between 1975-76 and 1987-88 the value of exports of fruits rose from Rs. .111 million to Rs. .646 million.

Several steps will however have to be taken to meet the specialized requirements of fruits and vegetables if the potential of these crops is to be realized. For example the perishable nature of fruit and vegetables, compounded by rough handling, lack of storage, packing and transport facilities results in post-harvest losses which go as high as 20-40% of the produce. Fruits and vegetables, especially potatoes and onions, face extreme fluctuations both in their production and consumption prices. Being highly

perishable these crops have to be sold and consumed in a relatively short periods of time. During surplus periods farm producers face devastating losses and during shortages consumers suffer from inordinately high prices. And over and above the uncertainties specific to these crops, frequent changes in government policies, particularly sudden export bans in periods of shortages, have severely affected the pace of development of food and vegetable crops and frustrated exporters in their efforts to establish growing foreign markets for them. A coherent and stable policy, particularly in relation to exports, has to be framed to ensure steady development of these crops. The export policies for these products must assure foreign buyers that convenient short run bans and quotas will not occur.

At present fruit and vegetable growing is by and large concentrated among farmers with relatively small holdings. However what is needed is for small farmers to be organized into large commercial cooperatives and bigger farmers to be encouraged to go into commercial fruit farming because it will be easier for them to use modern farming techniques, supply fruits and vegetables in bulk, ensure standardization, interact more effectively with agencies concerned with inputs, extension and marketing, and on the whole they can also respond better to international demands.

The arrangements for the production and distribution of fruit and vegetable seeds are also extremely poor. Very few public or private agencies are producing vegetable seed in the country. About 2000 tons of seed, worth approximately 60 million rupees is imported annually without much regard to their suitability for local conditions. Fruit plants are of poor genetic material and are frequently diseased, while research on the development of new varieties and on grafting and propagation is at an elementary stage. Universities and extension services therefore need to pay special attention to these problems.

### **Role of Livestock**

The present role of the livestock sector in the economy of Pakistan reflects to a large extent the historic role of livestock and its products in the rural economy. The primary purpose of livestock-keeping has been, and largely still is, to meet from the farm's own resources some of the basic dietary and work performance requirements, with the generation of cash income as a second objective.

The close integration of the livestock sector with the rural subsistence

economy is made possible by the use of crop residuals for livestock feed. In most cases crop residuals and the growing of fodder crops which fit into ongoing farming systems.

Rapid economic development in the past and projected for the future results in considerable pressure on the livestock sector to increase its outputs as demand for meat and milk rises. This is the case in the urban areas where incomes are already higher. It is also the case throughout the rural areas when production and incomes rise.

**Work Animals:** The number of work animals are estimated to have declined from 3.2 million pairs in 1976 to 2.3 million pairs in 1984. The decline has been due mainly to the introduction of tractors, which increased from 36,305 farm tractors in 1971-72 to about 218,544 in 1987-/88.

The fall in numbers of draught animals is most significant on large farms, as tractor ownership is strongly correlated with farm size. However, many small farmers have also reduced numbers of draught animals because by using tractor hire service, they are freed from the need to devote part of their limited land holdings to the cultivation of fodder crops. About 2.5 million households keep almost 55% of the indigenous cattle population on small irrigated areas.

**Dairy:** The dairy industry of Pakistan has achieved a somewhat advanced level of development with high levels of per capita production, and a broad array of processed milk products (Anjum, Muhammad, Stan Kraus, Kamil Lodhi, Agha Abbas Raza, Forrest Walters, 1988). Milk production per capita, as estimated by the Livestock Division of the Ministry of Food, Agriculture and Cooperatives, in 1988 has reached 124 Kgs. per year. The offtake for human consumption would be somewhat less, perhaps, 100 Kgs. per capita as suggested by estimates made of consumption by the Federal Bureau of Statistics in 1985. This high level of production and consumptions greater than a number of developed countries and unmatched by any large country of South Asia. The cost of milk to consumers is roughly a quarter of total value of food purchased. However, prices are low by international standards. At this time an important problem in the dairy industry is the overbuilt Ultra High Temperature milk processing business. Capacity is roughly double the current market. In addition the dairy production industry is facing tight feed supplies as it attempts to maintain production growth in line with the demands of a growing population with increasing incomes. Finally, the GOP does not develop statistically significant annual data on livestock numbers and

production in the dairy industry.

**Poultry & Fish:** Poultry production has over the last decade grown very rapidly as compared with the overall performance of the livestock sector. The sector has gained a strong position in the national economy and has helped reduce the demand pressure on the resources for the supply of animal protein foods. As the demand for meat has grown commercial poultry production has filled the gap between the higher demand and the slower growth of beef and mutton production (Walters, Forrest, Agha Haider, Larry Morgan and Khalil Sattar, 1987).

Compared to production of other meats in Pakistan, the commercial production of chicken meat is directly dependent on the availability of grain and high protein feeds. Commercial broiler production provides about half the total supply of chicken meat. The other half is supplied by scavenging desi birds with some smaller supplemental feed requirements. In comparison to grain and high protein consuming commercial broiler production, beef, buffalo, mutton, and goats feed on roughage and fodder. Fish have somewhat lower feed conversion ratios than commercial poultry but, currently, fish production is an insignificant portion of the total meat supply in Pakistan. Fish production is now growing rapidly and may become a more important source of food. The sector is expected to achieve a target of 6180 million eggs and 265,000 metric tons of poultry meat by the end of the 7th five year plan. This represents a growth rate of about 12% per annum and exceeds the projected availability of feed. Investments in this sector are largely from the private sector.

**Sheep:** There are some 28 breeds of indigenous sheep of which 12 are fat-tailed. All breeds are kept for mutton production, but about half produce some milk as well, and all but two breeds produce wool.

There are about 50 million sheep and goats in Pakistan. The sheep population is estimated to have increased by just over 1% per year. It seems likely that sheep numbers have in fact declined in irrigated crop areas, partly because they are being replaced by goats. Local sheep breeds usually breed once a year, and rarely produce twins. In higher rainfall areas and in cropped areas sheep may breed more than once annually.

**Goats:** Recently, the goat population has increased more rapidly than other red meat producing livestock. Since 1980 the rate of increase is estimated at more than 3% per annum. The rapid increase is partly due to their high

fertility and short reproductive cycle and partly to a consumer preference for goat meat. In irrigated crop areas it appears that goats are replacing sheep. There are more than 20 breeds of goats recognized in Pakistan. They may be classified into milk producing, non-milk producing and long haired types. Most local goats breed more than once a year and twinning is common; kidding percentages vary between 100 and 150% but mortality may reach 25 percent with confined animals.

**Feed Requirements:** Feed for the various livestock populations in Pakistan is derived from the crop sector, range lands and other grazing areas. Agro industrial by-products and animal/fish meals and wastes also provide some proportion of the total feed. Total feed availability from all sources is estimated to be 47.3 million tons of Total Digestible Nutrients (TDN) and 4.32 million tons of digestible Protein (DP).

On the basis of existing number of animals in different production systems and their likely feeding levels, present consumption works out to be 49 million tons of TDN and 4 million tons of DP. Therefore, existing feed resources appear to be roughly in balance with livestock requirements at present levels of performance. However, micro level studies have indicated that most of the animals are fed 20 to 25 percent below the amount required to enable them to produce at their full genetic potentials.

Estimated production of mixed concentrate feeds have grown by roughly 3.1% per year from 1971-88. This is somewhat slower than the 5.6% per annum growth in total meat and fish production over the same period. Most of the growth in total meat and fish production, beyond growth in concentrate feed availability, has been obtained through greater efficiency due to improved feeding practices. Poultry and fish are more efficient concentrate feed users than cattle, buffalo, sheep and goats and some gains in concentrate feeding efficiency are made as a larger portion of meat production is devoted to poultry and fish. However, in Pakistan, this is an insignificant amount because cattle, buffalo, sheep and goats largely feed on forages.

### **Major Livestock Products**

**Eggs:** Egg production has grown at an average annual rate of 13 percent from 1971-72 and 1987/88. In 1987/88 and 1988/89 production of eggs was severely affected by an outbreak of diseases. Several teams were fielded by FAO and MINFA to identify and suggest preventive measures for these poultry death losses.

Per capita consumption has continued to grow and attained a level of 40 eggs in 1983. The sector is expected to achieve a target of 6180 million eggs by the end of the 7th Five Year Plan. This is likely to increase the per capita annual availability of eggs from 40 to 52 by 1993.

Variations in egg consumption are significantly associated with real egg prices and income charges. Egg prices have increased at an average rate of about 8 percent per year since 1970-71. The general upward trend in prices has been sustained by substantive increases in per capita income and a gradual acceptance of commercial eggs in place of the more favored desi eggs.

Per capita availability of eggs in Pakistan has been growing at an annual rate of 9 to 12 percent during the last decade. This growth has resulted from continued and uninhibited investment in the poultry industry. Over time, the growing volume of eggs on the market has also forced lower market prices and a wider distribution of the product among different income groups.

The variable and low quality of local feed ingredients is a major constraint to the sector's continued growth. Other constraints are sluggish wholesale business, and poor packing, and grading of the product. Egg marketing in Pakistan is a low keyed operation, with little promotion and limited effort to differentiate product quality.

**Meat:** The per capita production of all meat and fish has grown at 2.3% per annum from 1971-72 to 1987-88. Per capita beef production has hardly grown during that period. Most of the growth in per capita meat production was the result of growth in the production of, mutton, fish and poultry ranked in the order of importance. Per capita meat production of Pakistan amounted to 16.5 Kgs during 1987-88 and was made up of roughly one third beef, one third mutton, one fourth fish and one twelfth poultry.

Commercial poultry meat is a net addition to the meat supply during the last 15 years. Production of poultry meat has increased at an annual average rate of 12% since 1971-72. During 1988-89 the growth rate declined because of an outbreak of disease and prices rose substantially. However, there is little indication that the demand for poultry meat has declined. Income and supply of beef are also important demand side parameters. Chicken meat supply is significantly affected by the price of chicken relative to the price of maize, and by the supply of cull or spent birds.

The distribution of poultry meat consumption is largely skewed toward higher income groups, with beef and buffalo consumed by middle and lower income groups. To meet domestic demand per capita meat production needs to grow by about 3.4% per year. This amounts to a doubling of meat per animal over the remaining years of this century.

Development of the meat industry is constrained by the largely traditional meat marketing system, which provides no incentive for the production of high quality meat. Other constraining factors are outmoded slaughter facilities, a conservative butchering structure, and no premium for beef quality. Relatively high processing costs restrict meat exports at competitive prices.

**Milk:** Milk production is an important part of agriculture. Buffaloes, cows, goats and sheep all contribute to milk production. In the farm enterprise milk production supplements and stabilizes farm income. A large part of the diet of milk producing animals is made up of roughage that are not used in producing food for human consumption or other farm production. For the landless farmers milk production is a major source of cash income. Overall milk production, in 1987, made up 18% of the gross national product contributed by agriculture and 4% of the total gross national product. Milk production as an enterprise or crop is second only to wheat which accounted for about 20% of the gross national product contributed by agriculture and 4.5% of the total gross national product.

The production and consumption of milk products in Pakistan is characterized by considerable seasonal variations. Production is at its maximum during the winter months and at a minimum in the summer, when temperatures are high and fodder limited. By contrast, milk consumption is at its peak in the summer. Buffalo milk is preferred by the consumer and makes up most of milk production.

Total milk production in the country, derived from all sources, is about 12.2 million tons. Buffaloes and cows contribute about 70 and 22 percent of the total domestic milk production, respectively. The remaining 8 percent of the milk comes from miscellaneous sources such as goats, sheep, camels etc. About 13 percent of total milk comes from peri-urban production units, but by far the greatest proportion comes from rural small holders. The volume of raw milk marketed is estimated to be 3.87 million tons; about 40 percent of total domestic milk production. The volume sold probably amounts to about 5 million tons due to the practice of diluting marketed milk with water. The milk prices paid to producers varies across the country and with the season

and other market conditions.

Per capita consumption of milk is considerably higher in rural areas than in urban areas; 75 percent of all milk produced is consumed in the rural areas. Consumption of processed UHT (Ultra High Temperature) milk amounts to only about 80,000 tons per year or about 2 percent of marketed milk consumption; 80 percent of the UGT milk is consumed by urban households. Milk production has not increased as rapidly as might be expected from the increase in numbers of buffaloes, though this may be partly explained by the reduction in the numbers of cattle and changing herd composition.

Major production and marketing constraints include: increasing production costs; spread of disease amongst the herd owned by peri-urban producers; low nutritional value of feed; seasonal fluctuations in demand and supply; and limited storage-life of fresh milk. Lack of consumer awareness about the qualitative benefits of UHT milk is a serious constraint in the marketing of processed UHT milk.

**Skins and Hides:** Skins and Hides are used as raw material in the leather tanning and manufacturing industry. Total production of Skins and hides is estimated at 31.3 million square meters ( $m^2$ ). About million  $m^2$  was imported in 1985-86. About 90 percent of local hides and skins are utilized in the tanning industry. Total production of finished leather in 1985-86 was 30 million  $m^2$ ; out of which 25.7 million  $m^2$  was exported and 4.3 million  $m^2$  was utilized in the domestic market.

Total value of exports of finished leather and leather products was Rs. 4.7 billion in 1985-86 compared to Rs. 1.7 billion in 1981-82, showing an increase of almost 30 percent per annum. Total value of imports was Rs. 80.7 million in 1985-86. The trade margins are low as the hide prices represent about 90 percent of the price paid by the tannery, while for skins this fraction is about 75 percent.

Lack of facilities for handling raw hides and skins, cut damages, poor preservation methods, non availability of de-natured salt, and absence of a formal grading system are the leading constraints of this industry. As a result, about 25 percent of hides and skins are seriously affected. This translates into loss of around Rs. 1 billion per annum in export revenues.

**Wool:** Wool is of some importance in the income of sheep owners. Most sheep are shorn twice a year; the spring shearing yields white wool which

fetches a high price, while the autumn clip is yellowish with a lower price. Raw wool production has increased from 22.1 thousand tons in 1971-72 to 53.2 thousand tons in 1986-87, showing an average increase of about 8.8 percent per annum. Clean wool yield is usually no more than 50 to 60 percent because the raw wool is often heavily contaminated with dirt, grease and vegetable matter.

Export prices for clean wool were Rs. 50 to 60 per kg in 1987. Slip wool export prices are 60 to 65 percent of those for fleece wool. Raw fleece wool sells in local markets for Rs. 10 to 25 per kg depending on color and quality. Pakistan exported 9,800 tons of raw wool on a clean weight basis in 1985-86. At the same time, 3800 tons of better quality wool was imported. Carpet yarn is further processed into carpets and hand knotted carpets have become an important export.

Lack of incentives for the producers to improve the quality of the marketed wool, is not so much a reflection of price, but of the value of the wool produced in comparison to the value of the animals for meat. Poor shearing techniques and low returns as compared to meat are some other noticeable constraints. In the short-run, wool quality of the existing flocks can be improved by using improved shearing techniques. The long-run option would be to introduce breeds that yield high quality wool, and persuade flock owners to keep large flocks of the same breed.

## **Manufacturing**

For purposes of this study food and fiber manufacturing consists of beverage manufacturing and bottling, tea blending, canning of all major fruits and vegetables, corn milling, wheat and rice milling, sugar and gur processing, milk plants, edible oil processing, cotton ginning, yarn and thread production, textile manufacturing, clothing design and production and leather production. The system as a whole in 1984-85 contributed 5.7% to GDP and 18% to total exports. It contributed 15.5% to government revenues through direct taxes. However, if 20% of the tax on imports and exports were also included, the contribution toward the exchequer increases to 26%. According to the manufacturing survey 1982-83, it also employs 16.2% of the total industrial labor force.

During the early seventies a number of food and fiber businesses were nationalized including fertilizer production, rice husking, cotton ginning and

edible oil processing. This action of the government, among other things, brought private sector investment in agribusinesses to a virtual stand still for a number of years.

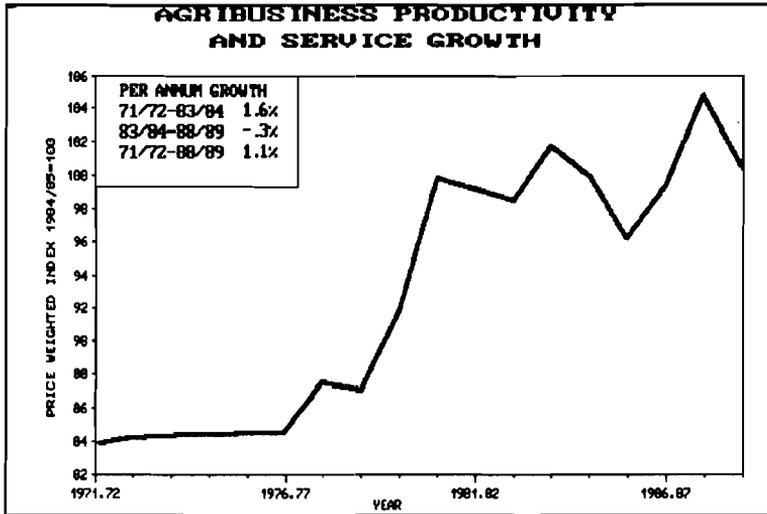
Private sector interest in agribusinesses however revived after deregulation in 1977-7. Nevertheless a number of firms in the public sector remained that are aging and in need of modernization. This is especially the case in the public sector textile manufacturing businesses. In fact Pakistan has been losing in the production of cotton cloth since 1971/72 at the rate of 5% per annum. This however contrasts sharply with long term growth in both cotton ginned and yarn production.

Most of the food and fiber manufacturing business is at present located in urban areas primarily because of lack of supporting infrastructure in rural areas. There are also a large number of cumbersome provincial regulations regarding the conversion of land under agricultural use to other uses which strongly discourage investments on business establishments in rural areas. Further, at this point the practice of forward contracting with producers for the raw product is not an established mode of business; consequently there is limited coordination between producers and manufacturers.

During the decade of the 80's agricultural business growth as shown by the nearby chart was constrained to the growth level of farm and forest production. On the whole, agricultural business continued to process, distribute, wholesale and retail the farm product at about the same levels. For the most part, there were no significant net new services added to the agricultural business sector. Further, "marketization" of the agricultural economy is necessary to encourage further development of agricultural business growth.

Marketization of the agricultural economy involves the development of services and a market economy. Currently, the government of Pakistan is "making up it's corporate mind" on the level of public sector involvement that is needed in the agricultural economy. This involves allowing important commodity prices to rise or fall to market levels and withdrawing public services engaged in commodity processing and distribution. It is generally expected that the rising private sector will provide more services. But as the private sector assumes greater responsibilities the need for regulations on competition, fair trade practices and collusion, and their enforcement becomes more pressing.

Figure 21



More specifically, growth of agricultural business depends on modification of government policies affecting industries such as sugar, milk, poultry, edible oils and fertilizer. Example of issues are discussed below.

In the sugar industry the need for self sufficiency is under question. Sugar cane production displaces valuable wheat, cotton and rice. Also a number of foreign exchange implications follow because wheat is chronically imported, cotton is Pakistan's major export, edible oil is a major import and rice is one of the more profitable exports.

In the milk industry there is a need annually to inventory livestock numbers and production. At present nearly 30% of peoples' diet, by weight, is made up of milk and selective policy actions need to be taken, from time to time depending on the position of production in the cycle, to meet social and economic needs. But estimates of livestock numbers are not accurate enough to show the swings of the ordinary livestock cycle. It is therefore rather difficult for the government to make and implement informed policies.

The poultry industry is an industry largely unhampered by government regulation. It has been growing at well over 10% per year for the last decade and is largely filling the gap between meat production and growing demand associated with climbing incomes. Studies have shown that growth in the industry is dependent on reducing import restrictions on high protein feeds because the domestically available high protein feeds are often contaminated and of low quality causing both disease and reduced conversion ratio's.

In the edible oils industry prices are held down by the government by importing from abroad heavy levels of relatively cheaper oils. With higher prices in neighboring areas a large amount of cheaper oil probably escapes into adjoining countries. The result is a costly program that could be corrected by allowing prices to rise to provide protection to domestic production and to reduce the share of imported oils in domestic consumption.

In the farm inputs businesses, production and sales are being constrained by investment regulations and price controls. Fertilizer prices are being held down by market domination from the public sector. In the seed business the introduction of new seeds and methods of producing seed are constrained by investment restrictions on foreign firms. The irrigation system is a supply driven system and farmers are unwilling to pay water charges necessary to maintain canals and water courses. A number of studies show that operation and maintenance expenditures have exceptionally high benefit costs.

Measures of productivity in agricultural business are usually specific to the industry. For example, in the sugar processing industry the recovery rate of available sugar in sugar cane is about 78% compared to the industry standard of 85%-92%. In the poultry industry the broiler production to feed ratio is around 2.5 compared to the industry standard of around 1.9. In the dairy industry Ultra High Temperature treated milk has to be supplemented with dry powder milk to meet solid content standards. Other agricultural businesses such as the fertilizer industry are undergoing "debottle necking" so that more output can be obtained and changing its conversion systems so that natural gas is converted to ammonia gas with less energy expended. The textile industry is converting to power looms and machinery that uses short staple cotton. However overall agricultural business productivity and growth in services improved at the rate of 1.6% annually during 1971-72 and 1983-84, but thereafter in the period 83/84 to 88/89 it declined at the rate of minus 0.3%. In the period 71-72 to 88-89 in its entirety the rate of growth was 1.1% per annum.

## **Food and Fiber Storage, Transportation and Communication**

The storage, transportation, and communication business related to food and fiber consists for the most part of government corporation grain storage and godown facilities, a multitude of privately owned trucking companies and a single government run rail facility. Communication involves several government printing corporations, telephone, telegraph etc. There is no direct estimates available for the contribution of the food and fiber storage, transportation and communication industry to the economy. Therefore, the indirect estimates shown here were based on the proportion of food and fibre output to the total output of the whole manufacturing sector. This ratio, according to the Census of Manufacturing Industries during 1982-83 was 52%. The food and fiber storage, transportation and communication industry contributes 2.7% to the GDP and 9.2% to the GDP in the food and fibre system during 1984-85. The contribution of this sector to the GDP does not mean that the food and fiber system channels most of it's output through this system efficiently to improve the time, space and form utility. Rather it implies costly transportation of output and inputs from and to the farm due to unimproved farm to market roads and high storage cost, due to scarce storage facilities and the inability of the farmers to manage efficiently the storage of their products. According to studies conducted for the Planning and Development Division, marketing margins for fruits and vegetables are as high as 56 to 72% of the prices paid by the consumer. This does not necessarily imply the exploitation of the farmers. Such margins are reported in developed countries too. However, services provided in those countries are usually superior. In Pakistan, high marketing margins usually reflect costly transport and inefficient storage facilities.

The food and fiber storage, transport and communication industry is an important activity in the efficient marketing and production of farm commodities. Improvements in the industry can lead to more stable prices and improved incomes for farmers and the industry. It can also improve the export potential of a number of agricultural commodities by improving quality and time of availability.

In summary high marketing margins, especially for the perishable commodities like fruits and vegetables, are often due to poor roads and the non-availability

of storage facilities to the common farmer. In some cases farmers are not capable of managing transport and storage for some perishables. In other cases poor financial conditions, lack of roads and the absence of on-farm storage, limit farmers in holding for higher seasonal prices or transporting to more opportune markets. The infrastructure development of this sector is to a large extent in government hands. government programs that distribute and store the major foods like wheat discourage participation by the private sector. Scarce public development funds are thus often spent on distribution programs as in the case of wheat and not on the development of adequate roads and other public infrastructure supportive of efficient transport, storage and communications.

## **Wholesaling and Retailing**

The wholesale and retail trade involves a large number of small privately owned assembly houses and retail outlets, as well as, semi autonomous bodies such as PASSCO, Cotton and Rice Export Corporations, AMSL and government run, "fair price shops" called Utility Stores. It absorbs about 9.3% of the labor force in the food and fiber system and 6.4% of the total labor force of the economy. It contributed 5.7% to GDP in 1984-85.

A study by a consulting group for the Planning and Development Division on Agricultural Marketing in Pakistan showed that a significant proportion of foodgrain crops are sold in the village itself to shopkeepers, itinerant merchants and others who purchase the produce during harvest to sell subsequently in the regulated prices at higher prices. These village sales, the study noted, are disadvantageous to the producer because of the unfair trade practices prevalent in these markets and the lack of avenues for redress of any grievances the producer may have.

The wholesale and commission agents constitute important intermediaries for several products especially foodgrains not subjected to government support prices. In the case of cash crops, the concerned processing units, ginning factories, sugar mills or tobacco companies are the main agencies to whom growers sell their output.

In the case of vegetables, village sales are important only for the less perishable as onions and potatoes. The perishables are taken to the markets and sold to the wholesaler or through commission agents. There are generally

three stages through which vegetables pass, i.e. the commission agents, wholesalers and retailers. The Commission agents sell for a commission while the wholesalers purchase through the open auction and sell to retailers in small lots. Vegetables are also sold through preharvest contractors who buy standing fields and themselves harvest and market the produce.

In the marketing of fruits, contractors often play an important role. They purchase the standing fruit crops at the flowering stage and attend it until it is ready for marketing. These contractors harvest the fruit, pack it and sell directly to commission agents and wholesalers in the main market.

The weekly livestock markets which were designed to enable the producer to get a better price have become convenient places for merchants to buy stocks at low prices taking advantage of competition between producers gathered to sell their surplus stock. These merchants then sell the stock at higher prices in city markets where producers find it impracticable to participate.

Raw milk is collected by the Katcha dodhi who serves as the link between millions of small producers and the consuming public. He collects the small marketable surpluses of fluid milk from several farm families and transports it either directly to consumers or to the milk collection centers. Other options available to him are the urban/small town milk shops or Khoya-makers. Wholesale and retail trade in manufactured food and fiber items as cloth, canned milk etc. is well established due to the ease of movement of these commodities and standardized grading systems.

According to the National Agricultural Commission Report, there is a lack of efficient wholesale markets. The imperfection of the marketing system (which is basically due to inadequate wholesale markets) leads to several unfair trade practices as collusion among traders to suppress prices to producers, excessive rates of various services, unreasonable quality and weight deductions, hoarding and price exploitation. To control these unfair practices, government has established some semi-autonomous marketing agencies. However, due to the lack of funds and bureaucratic anomalies, these agencies have failed to fully achieve their objectives.

At this point, there are not any efficient systems of packaging, grading and standardization of produce, especially perishables. There is almost no grading of perishables at the farm and wholesale level. There is some grading at the retail level. There is also substantial damage in transport and storage due to the lack of packaging.



# 5

# Input/Output Analysis of Pakistan

---

## Food and Fiber System

The food and fiber system to date has been described, to some extent, as an independent sector. However, the opposite is true. The food and fiber system is interlinked with almost every sector of the, "rest of the economy." It both contributes to and depends on the rest of the economy. This interdependence is studied through input-output analysis and is shown most clearly in the so called transactions matrix (Walters, Forrest, 1988). The "transactions matrix" is a tableau of transactions, by industry sector, of the economy. The transactions are arranged in a matrix so that sales among sectors can be read across rows of the matrix. The following table shows the 1984/85 transactions matrix which has been consolidated for presentation purposes. (see table 12)

As sales are read across rows, purchases among sectors are read down columns of the matrix. The first columns in the matrix consist of industry sectors and a household sector that are producing, processing and transferring goods and services. The last columns in the matrix are usually government services, investments and exports. These are called final demands because they are the final users of good produced. The first row of the matrix are the industry sectors that are involved in some stage of producing or processing goods and services. The last rows of the matrix are taxes, savings and imports and are called final payments. Because final payments leave the transactions economy they are often called "leakages."

TABLE 12

PAKISTAN INPUT-OUTPUT ANALYSIS [1]  
TRANSACTIONS MATRIX 1984-85  
(Rupees Million)

ROW	FARM INPUTS	AGRICU- LTURE	MFG-F FIBER	TS&C F&FIB.	W&R.T F.&FIB.	MFG- OTHER	TS&C W&R.T-O	CON.O. D M&Q.	SER, BI P. A&E	HOUSE- HOLDS	EXPORTS	INVEST/ DESCREP	TOTAL SALES
	1	2	3	4	5	6	7	8	9	10	11	12	13
<b>FOOD AND FIBRE SYSTEM:</b>													
AGRICULTURE	0	2929	0	0	0	2	0	0	0	0	937	2705	6573
MFG-F&FIBER	0	46251	104428	2060	0	903	17	2171	653	21896	12084	-1488	188975
T.S&C-F&FIB	1	0	9422	0	0	1043	1766	0	0	5294	0	18258	35784
W&R.T.F-FIB	0	0	13719	0	0	1025	0	0	0	32793	0	-5180	42357
<b>REST OF THE ECONOMY:</b>													
MFG-OTHERS.	608	1723	4719	1526	0	32345	10125	16918	2077	12810	5562	31192	119605
TS&C,WRT-O	1156	21761	2128	0	0	17073	390	1132	3562	34771	0	2979	84951
CON,O.D,M&Q	257	275	48	39	0	2484	369	4334	119	23825	0	47983	79733
SER,PA&D,BI	241	2475	5939	57	1002	3634	13341	6298	25267	28323	15675	24384	126632
<b>PRIMARY INPUTS:</b>													
HOUSEHOLDS	420	30484	18157	6743	3702	14518	8029	22942	22937	1303	38311	219290	386838
ELECTRICITY	36	613	1446	23	59	1117	63	0	614	2152	0	1056	7178
GAS	559	0	1840	0	43	1748	43	0	144	1558	0	2906	8842
IMPORTS	2193	5137	17517	12245	95	14147	12339	2620	5171	37834	0	4110	113408
T-SUBSIDIES	21	-1063	7527	0	0	7902	500	12	169	608	25804	779	42258
SELF EMPLOY- MENT, RENT & SAVINGS	1080	78389	23109	13089	37436	17745	37966	23252	62151	39000	0	2971	336188
T.PURCHASES	6573	188975	261316	35784	42357	119605	84951	79733	126632	386838	114959	392915	1840638

1 = Manufacturing of farm-inputs; 2 = Crop, livestock and forestry production; 3 = Manufacturing of food and fiber; 4 = Transportation, storage and communication of food and fiber; 5 = Wholesale and retail trade of food and fiber; 6 = Manufacturing of other commodities; 7 = transportation, storage, communication and wholesale and retail trade of other commodities; 8 = Construction, ownership of dwelling, mining and quarrying; 9 = Services, public administration, defence, banking and insurance; 10 = Household; 11 = Export; 12 = Investment and discrepancies; 13 = Total sales. F

From this table a number of calculations can be made showing the contribution of the food and fibers system. In this case the Food and Fiber System is classed into five subsectors, Farm Inputs Manufacture, Agriculture or farming, Food and Fiber Manufacture, Food and Fiber Transport, Storage and Communications, and Food and Fiber Wholesale and Retail Trade.

A most striking feature of the transactions table is that the food and fiber system purchases and sells to almost all the sectors of the economy. The following sections describe in more detail the interdependence of the economy through the contributions of the food and fiber system to major economic factors as value added, employment, imports and exports.

### **Contribution Value Added**

Most value added is from labor from the household; in 1984/85 roughly 42% of the total value added was from that source. However, in the form of products, the food and fiber system contributed about 29% of the total value added; about the same amount that is contributed by the rest of the economy. The following table depicts the contribution to value added by each subsector of the food and fiber system. (see table 13)

Since 1975-76 there are several interesting shifts in the economy. The largest is the decline in final demand or the reduction in the contribution of labor to value added. Another important shift is the growth in the contribution of the "rest of the economy." This has occurred because of the large contribution being made by the return of wages from workers overseas. There have also been some interesting changes in the food and fiber system with the farm or agriculture contribution declining while manufacturing and wholesale and retail trade have increased.

### **Contribution to Employment**

The food and fiber system is the largest source of employment in Pakistan. This is largely due to the disproportionate amount of labor involved in farming. As seen in the following table, over 50% of the labor force of Pakistan is locked in farming or agriculture. The "rest of the economy" is making relatively slow gains in providing further employment, as a proportion it is up from 28% in 1975-76 to only 32% in 1984-85. (see table 14)

As shown below some progress has been made in shifting labor from farm employment to other parts of the economy. However, as discussed in the

section, "Macroeconomic Setting In Pakistan," the structural shift in the economy that supports the movement of labor in farming to other parts of the economy has been slow. Most likely the growth in employment has been in the informal part of the economy with household employment in cottage industries. It should also be noted that a significant proportion of labor has moved overseas and is contributing to the economy through wages that are returned to Pakistan.

TABLE 13 CONTRIBUTION OF THE FOOD AND FIBER SYSTEM TO VALUE ADDED

	1984-85		1975-76	
	Value	% share	Value	% share
Food and Fiber System:				
Agriculture	108873	15.1%	39727	17.5%
Manufacturing Farm Inputs	1501	0.2%	379	0.2%
Manufacturing	41267	5.7%	7971	3.5%
Wholesale & Retail Trade	41139	5.7%	10597	4.7%
Transport, Storage & Comm.	<u>19832</u>	<u>2.7%</u>	<u>4732</u>	<u>2.1%</u>
<b>Subtotal</b>	<b>212612</b>	<b>29.4%</b>	<b>63406</b>	<b>27.9%</b>
Rest of the Economy	209540	29.0%	51692	22.7%
Final Demand	<u>300875</u>	<u>41.6%</u>	<u>112494</u>	<u>49.4%</u>
<b>Subtotal</b>	<b>510415</b>	<b>70.6%</b>	<b>164186</b>	<b>72.1%</b>
<b>TOTAL</b>	<b>723027</b>	<b>100.0%</b>	<b>227592</b>	<b>100.0%</b>

TABLE 14 CONTRIBUTION OF THE FOOD AND FIBER SYSTEM TO EMPLOYMENT (Million Employees, 1984/85 and 1975/76)

	1984-85		1975-76	
	Employees	% share	Employees	% share
Food and Fiber System:				
Agriculture	13.629	50.9%	11.124	55.1%
Manufacturing Farm Inputs	0.082	0.3%	0.028	0.1%
Manufacturing	2.212	8.3%	1.596	7.9%
Wholesale & Retail Trade	1.718	6.4%	1.154	5.7%
Transport, Storage & Comm.	<u>0.581</u>	<u>2.2%</u>	<u>0.600</u>	<u>3.0%</u>
<b>Subtotal</b>	<b>18.222</b>	<b>68.1%</b>	<b>14.502</b>	<b>71.9%</b>
Rest of the Economy	<b>8.554</b>	<b>31.9%</b>	<b>5.669</b>	<b>28.1%</b>
<b>TOTAL</b>	<b>26.776</b>	<b>100.0%</b>	<b>20.171</b>	<b>100.0%</b>

## **Contribution to Exports**

Exports can be examined by looking at merchandise exports and at all exports. An examination of merchandise exports is the most common method of describing contributions to exports and is the method used earlier in this statement. However, in order to adequately account for wages returned by overseas workers all exports are examined in this case. One of the most significant factors in the growth of the Pakistan economy has been the growth in services exported which consists largely of repatriated wages. During 1975-76 service exports amounted to around 10% of total exports, by 1984-85 they had grown to 44% of total exports. As shown by the following table this phenomenal growth has largely overshadowed the growth in exports from the food and fiber system.(see table 15)

The food and fiber sector exports as a proportion of total declined from 37% during 1975-76 to 32.2% during 1984-85. Despite the decline in portion of total, growth in the absolute levels was exceptional. Food and fiber sector exports grew by an annual average of 15% per year between 1975-76 and 1984-85. Growth in manufactured food and fiber products was even larger at 18% per annum. The growth in manufactured farm inputs was largely an anomaly since most was accounted for by growth in fertilizer exports which occurred in 1984-85. Pakistan is normally a net importer of fertilizers.

In the future food and fiber exports will likely make up a larger portion of total exports because service exports have begun to decline. Employment in the Mideast has declined with the revenues from oil and oil product sales.

## **Contribution to Imports**

The food and fiber system as a whole became relatively more import demanding during the nine year period between 1975-76 to 1984-84. This is occurring as agriculture becomes more mechanized and uses more fuel which is largely imported. In addition the growing food and fiber manufacturing subsector uses a larger proportion of imports. In fact growth in the entire economy is heavily dependent on imported fuel and technology. The following table (16) shows imports by sector.

It is important to note that farming is a net exporter, that is exporting more than it imports. For example, in 1984/85 farm exports amounted to Rps. 12,084 million while imports amounted to Rs. 5,137 million. However, the overall food and fiber system is a net importer. In 1984-85 food and fiber sector exports amounted to Rs. 29,607 million while imports amounted to Rs. 37,187 million. The major import dependance is on fuels used in the transport, storage and communication subsector.

The "rest of the economy" subsector is also import dependent and will probably become more so as repatriated wages declines and as the industrial sector builds. In short the Pakistan economy is very dependent on imports and is in need of developing further exports. Part of the negative balance is currently absorbed through donor transfers. The most prevailing import at this point appears to be energy or fuel for expansion and modernization.

TABLE 15 CONTRIBUTION OF THE FOOD AND FIBER SYSTEM TO EXPORTS  
(Million Rupees, 1984/85 and 1975/76)

	1984/85		1975/76	
	Value	% share	Value	% share
<b>Food and Fiber System:</b>				
Agriculture	12084	13.1%	4561.5	20.0%
Manufacturing Farm Inputs	937	1.0%	156.5	0.7%
Manufacturing	16586	18.0%	3731.0	16.3%
Wholesale & Retail Trade	0	0.0%	0	0.0%
Transport, Storage & Comm.	0	0.0%	0	0.0%
<b>Subtotal</b>	<b>29607</b>	<b>32.2%</b>	<b>8449</b>	<b>37.0%</b>
<b>Rest of the Economy</b>				
Services	40711	44.2%	2267.1	9.9%
Re-export	478	0.5%	167.0	0.7%
<b>Subtotal</b>	<b>62426</b>	<b>67.8%</b>	<b>14386.1</b>	<b>63.0%</b>
<b>TOTAL</b>	<b>92033</b>	<b>100.0%</b>	<b>22835.1</b>	<b>100.0%</b>

TABLE 16 CONTRIBUTION OF THE FOOD AND FIBER SYSTEM TO IMPORTS  
(Million Rupees, 1984/85 and 1975/76)

	1984/85		1975/76	
	Value	% share	Value	% share
<b>Food and Fiber System:</b>				
Agriculture	5137	4.5%	726	2.0%
Manufacturing Farm Inputs	2193	1.9%	270	0.7%
Manufacturing Food & Fiber	17517	15.4%	4807	13.0%
Wholesale & Retail Trade	95	0.1%	0	0.0%
Transport, Storage & Comm.	<u>12245</u>	<u>10.8%</u>	<u>3157</u>	<u>8.5%</u>
Subtotal	<b>37187</b>	<b>32.8%</b>	<b>8960</b>	<b>24.2%</b>
<b>Rest of the Economy</b>				
Consumer Goods	<u>34277</u>	<u>30.2%</u>	<u>11934</u>	<u>32.3%</u>
	<u>41944</u>	<u>37.0%</u>	<u>16076</u>	<u>43.5%</u>
Subtotal	<b>76221</b>	<b>67.2%</b>	<b>28010</b>	<b>75.8%</b>
TOTAL	113408	100.0%	36970	100.0%

## Energy Consumption

The food and fiber system consumes large amounts of energy in manufacturing farm inputs, manufacturing food and fiber products and in transportation and storage. The food and fiber system consumes 41% of all the energy used in Pakistan. This is twice the level of the amount consumed by the household. The share of energy used by sectors of the economy are shown in the following table (17).

Since 1975-76 the highest rate of growth in energy consumption has been by the household sector at about 13% per annum. Energy consumption by manufacturing of farm inputs and food and fiber products have also been relatively rapid. Both are the result of modernization and growth in the individual subsector. On the other hand, growth in energy consumption by the "rest of the economy" subsector has been much less consistent with economic growth in that sector.

TABLE 17 ENERGY CONSUMPTION BY THE FOOD AND FIBER SYSTEM  
(Metric Tons of Oil, 1984-85 and 1975-76)

	Oil Equiv- alents	% Share	Oil Equiv- alents	% Share
<b>Food and Fiber System:</b>				
Agriculture	891139	5.6%	642838	8.3%
Manufacturing Farm Inputs	2072056	13.0%	751058	9.8%
Manufacturing	2118203	13.3%	1031212	13.4%
Wholesale & Retail Trade	64454	0.4%	24526	0.3%
Transport, Storage & Comm.	<u>1389722</u>	<u>8.7%</u>	<u>893312</u>	<u>11.6%</u>
Subtotal	<b>6535574</b>	<b>41.0%</b>	<b>3342946</b>	<b>43.4%</b>
<b>Rest of the Economy</b>				
Household Consumption	6539552	41.0%	3433166	44.6%
	<u>2861842</u>	<u>18.0%</u>	<u>922996</u>	<u>12.0%</u>
Subtotal	<b>9401394</b>	<b>59.0%</b>	<b>4356162</b>	<b>56.6%</b>
TOTAL	15936968	100.0%	7699108	100.0%

## Output Multipliers

The multipliers shown in the following table are the result of input requirements for additional production to satisfy final demands. The multipliers discussed here are often called business multipliers because they represent the "business" generated from an additional rupee of production. The multiplier also represents the number of times a rupee "turns over" as it becomes a rupee of additional production. (see table 18)

The table shows the additional output that is generated in the economy when one rupee of additional production in the selected sectors is generated and passed through final demands. For example if exports of agricultural products (a final demand) are increased by Rps. one million total output in the economy will increase by Rs. 2.39 million, or if overseas wage earners invest ten million rupees the construction of poultry houses total output required in the economy to produce the poultry houses will amount to Rs. 28.5 million.

TABLE 18 OUTPUT MULTIPLIERS FOR SELECTED SECTORS OF THE ECONOMY

Sector Multiplier	1984-85
Food and Fiber System:	
Farm Input Manufacturing	1.97
Agriculture (Farming)	2.39
Manufacturing	3.00
Transport, Storage & Communication	1.82
Wholesale & Retail Trade	1.32
The rest of the Economy:	
Manufacturing	2.63
Transport, Storage & Communication, Wholesale & Retail Trade	2.00
Construction, Ownership of Dwellings, & Mining and Quarrying	2.85
Service, Public Administration, & Banking & Insurance	2.18
Households	3.01

Of special interest is the relatively high multiplier of 3 for the food and fiber manufacturing sector. This indicates a high impact of food and fiber manufacturing production on the economy and business activity. In the larger transaction matrix where construction is shown separately the multiplier is equally as high. Also, the high multiplier for the household represents a high impact of additional expenditures on labor. Households have a relatively high propensity to consume.

The National Commission on Agriculture projected a US\$ 2.258 billion increase in exports from the agricultural sector by 1992/93. This implies that the output of the national economy, through the impact of added exports, will increase by US\$ 5.396 billion.

Food and fiber exports will more than triple to Rps. 88.7 billion by 1992 compared to the 1984-85 levels of Rs. 29 billion if the past trend of a 15% increase per annum persists. This increase would stimulate roughly a Rs. 147 billion in increased economic activity. Another way of considering the impact is to calculate the growth in total sales of the economy. A 15% growth at the current levels of exports represents a change of Rs. 4.35 billion in food and fiber exports. Using the food and fiber multiplier of roughly 2.5 the total impact would be Rs. 10.875 billion which is .6% of the total 1984-85 national sales of Rs. 1,850.6 billion. In other words a 15% increase in food and fiber exports per year would lead to a .6% growth in the national economy.



## **6 Food Consumption Pattern**

---

Food consumption patterns in Pakistan are unique and changing. By weight nearly three quarters of the diet is made up of cereals and milk products. In addition over half of the expenditures for major food items are spent on cereals and milk products. However, this pattern is changing as a larger portion of the population shifts to more meat, fruits and vegetables. It is generally thought that as incomes increase the consumption of meat and especially poultry products will increase, along with fruits and vegetables. The following table shows estimates of annual consumption of food groups in Pakistan for 1971-72 and 1984-85. (see table 19)

The table below indicates the general magnitude of consumption of major food groups and direction of change. The estimates are based on a statistical sample of consumption over one month and are subject to seasonal, as well as, recall bias. Two conflicts in estimates stand out; Production data indicate that pulse production and consumption is declining as compared to the data here which indicates pulse consumption to be constant or increasing slightly. In addition, production data indicates that poultry production is increasing at 10%-15% per year, while poultry consumption is shown here as remaining almost constant if 1971-72 is compared to 1984-85. Although, more recently in 1987-88 and 1988-89 poultry production declined due to major disease problems.

As the food consumption pattern shifts to more meat the preferences for meats are more easily observed. Mutton is the preferred meat followed closely

by chicken and fish. Beef, consisting of both buffalo and cow meat is last in the order of preferences. Prices also reflect the same pattern. Both chicken and mutton are used for ceremonial occasions as well as cuisine dining. On the other hand, when meat is served, beef is more common among poor families. For the poor, pulses are the more common food used to increase the quality of protein.

TABLE 19 ANNUAL PER CAPITA FOOD CONSUMPTION IN PAKISTAN [1]  
Kilograms, 1971-72 and 1984-85

FOOD ITEM:	1971/72	1984/85	1971/72	1984/85
	Kgs.		% of Total	
Cereals, including baked and fried products	150.00	143.88	45.2%	44.1%
Pulses	6.48	6.84	2.0%	2.1%
Milk and milk equivalents	109.56	100.80	33.0%	30.9%
Vegetable Ghee & Mustard	2.76	7.32	0.8%	2.2%
Oil, Meat & Fish	5.88	7.44	1.8%	2.3%
Poultry products	1.74	1.80	0.5%	0.6%
Fruit & Vegetables	42.24	44.88	12.7%	13.7%
Sweeteners	12.84	13.56	3.9%	4.2%
TOTAL	331.50	326.52	100.0%	100.0%

[1] Based on monthly data from government of Pakistan, Ministry of Finance, Planning and Development, Statistical Division, Household Income and Expenditure Survey, 1971-72 and 1984-85.

The most dramatic of all the changes in the Pakistani diet is the substantial increase in vegetable oil consumption. First of all per capita consumption of vegetable ghee and desi ghee together increased from .42 kg in 1969-70 to .68 kg in 1984-85, an increase of 3% per annum, but per capita consumption of vegetable ghee alone rose at the annual rate of 8% and that of desi ghee by itself declined at the rate of 5%. In other words, over all consumption of vegetable ghee rose at an average annual rate of about 11% in the fifteen years between 1969-70 and 1984-85. It is even more striking that the entire increase in per capita calorie consumption experienced during 1973 to 1984 came from increased consumption of oils. An estimate made by Goldmann on the basis of Household Income Expenditure Surveys shows that between 1973 and 1984 per capita calorie consumption increased by 95 calories and that all of this increase was due to oils as the contributions of other sources of calories such as cereals, sugar, roots, and pulses declined.

This extraordinary increase in the consumption of oils has come about partly in response to rising per capita incomes but substantially as a result of import and pricing policies of the government. First, the index of the real price of vegetable ghee declined from 114 in 1970-71 to 70 in 1984-85 which made vegetable ghee relatively cheaper than all other foods; and, secondly, vegetable ghee has always been cheaper than desi ghee which led to massive substitution of desi ghee by vegetable ghee in consumption. Even though between 1951-52 and 1988-89 the wholesale prices of vegetable ghee increased at the average annual rate of 10% compared with 7% of desi ghee the ratio between the prices of desi ghee and vegetable ghee was still 2.75. In 1951-52 this ratio was as high as 8.76. However it is obvious that if the past trends continue in the future, fairly soon the prices of the two products will become equal. This means that the possibilities of substitution between the two products are now about to end. It may perhaps be reiterated that at the back of these changes lie the determination of the government to hold consumer prices of vegetable ghee down through its import policy, continuous adaptation of the taxes on-the-frontier, lack of adequate protection to indigenous production of oil seeds and the dominance of the public sector in the conversion of oils to ghee.

Sweetener consumption consists largely of refined sugar. In the rural areas local sweeteners are made from sugar cane. The most popular is gur. It is made by boiling cane juice down to a thick consistency, than adding soda and allowing to cool, spread thinly over a cool surface. Refined sugar is gradually crowding gur and other home made products out of the market. The price of sugar is kept relatively high with 25% custom duties on imports and 24% excise taxes on sugar refined domestically.

Expenditure patterns for food follow roughly the same pattern as actual consumption as shown by the following table (21).

The quantity of food consumption patterns discussed are followed to a large extent in food consumption expenditures. Although the magnitude of decline in expenditure on cereal products is probably associated with some aberrations in the wheat market during the two periods under observation. Most of the cereal products consumed in Pakistan are derived from wheat.

In summary, the food consumption pattern, in Pakistan is shifting towards products typically associated with increases in income. In this case both the quantity and proportion of the budget is shifting from cereal and milk products to meat, poultry, fruits and vegetables, and edible oils. Despite the

shifts cereal and milk products are still a major part of the amount and cost of food consumed in Pakistan.

TABLE 21                    DISTRIBUTION OF EXPENDITURES ON MAJOR FOOD ITEMS [1]  
Percentage per Household, 1971-72 and 1984-85

FOOD ITEM:	1971/72	1984/85	Difference
	%		(% Points)
Cereals, including baked and fried products	38.8%	28.7%	-10.1%
Pulses	3.7%	4.4%	0.7%
Milk and milk Equivalent	27.9%	27.5%	-0.4%
Vegetable Ghee & Mustard oil	5.5%	7.8%	2.3%
Meat & Fish	6.8%	8.8%	2.0%
Poultry products	1.2%	2.7%	1.5%
Fruit & Vegetables	8.2%	12.2%	4.0%
Sweeteners	7.9%	8.0%	0.0%
TOTAL	100.0%		100.0%

[1] Based on monthly data from government of Pakistan, Ministry of Finance, Planning and Development, Statistical Division, Household Income and Expenditure Survey, 1971/72 and 1984/85.



1/20

# **7      Functioning of the Food and Fiber System in Pakistan**

---

## **Government Functions**

### **Agricultural Administration**

Although agriculture is constitutionally a provincial subject in Pakistan, the provincial governments operate within an overall policy framework for agriculture developed by the Federal government in consultation with them. The Federal Ministry of Food, Agriculture & Cooperatives (MINFA), which is headed by a federal Minister has two divisions: the Food and Agriculture Division and the Agricultural Research Division. The Agricultural Prices Commission is another important organization of the Ministry of Food, Agriculture and Cooperatives. The Ministry always works in close cooperation with the Planning Commission, a body responsible for five year and annual development plans of the country. There are also a number of other semi-autonomous bodies operating within the general framework of government operations though outside the administrative jurisdiction of this Ministry which exerts much influence on agricultural and resource development. Most prominent among these are:

Water and Power Development Authority (WAPDA)  
Agricultural Development Bank of Pakistan (ADBPA)  
Pakistan Agricultural Research Council (PARC)

At the provincial level, the following three departments play a dominant role for agricultural and rural development:

Department of Planning and Development  
Department of Irrigation and Power  
Department of Agriculture/Livestock

In each province, the organization of the Department of Agriculture and its scope of activities is slightly different as indicated below by their respective designation.

NWFP	Dept. of Agriculture, Forestry and Cooperatives (includes Livestock)
Punjab	Dept. of Agriculture Dept. of Livestock and Dairy Development Dept. of Forestry, Fisheries and Wildlife Dept. of Food
Sind	Dept. of Agriculture, Food, Livestock and Fisheries Dept. of Wildlife and Forests
Baluchistan	Dept. of Agriculture and Cooperatives Dept. of Animal Husbandry Dept. of Forests

One of the most important function of the federal government with respect to the food and fiber system is providing and managing food security for the country. This is done through emphasis on fixing domestic production targets for major food and fiber commodities and making every effort to arrange and supply the requisite level of agricultural inputs for meeting those targets. Any shortfalls in production due to bad weather or shortage of basic inputs are met through imports under various trade agreements. The government keeps a close watch on the production cycle and in case of a pessimistic production outlook, prior arrangements are made to import food grains and other commodities.

During the eighties, the government policy has been to reduce the role of the public sector and to make the private sector the engine of development. Many

steps have been taken during the past few years to deregulate the economy and to increase the active participation of the private sector. Deregulation is however a continuing process and the government needs to press ahead to maintain momentum for improving the efficiency of the food and fibre system.

The involvement of the public sector in the manufacture, storage and distribution has varied for each agricultural inputs. For example, fertilizer production is about equally shared between the public and the private sector. Most of the imports and local supply is still very much handled by the government. Approximately, 80 percent of retail marketing and sales are done through the private sector. The most significant changes in fertilizer policy have been the deregulation of nitrogen prices and private sector permission to export and import fertilizers. Deregulation brought in competition amongst fertilizer companies for the benefit of the farmers. It has allowed the industry and the investors to re-evaluate the future investment in a relatively more predictable manner. There is still a reluctance on the governments' part to allow the market to operate completely freely. The government continues to pressure the private sector to keep prices constant throughout Pakistan regardless of location and also to keep them constant throughout the year. But this hampers the fluent movement and storage of fertilizers. On the other hand fertilizer companies appear to act collectively in market sharing and pricing.

The production, storage, and distribution of improved seed of major crops is in the public sector although private sector has now been encouraged to enter this area of activity. The Punjab and Sind Seed Development Corporations produce the recommended variety seeds through registered growers which is then distributed through their own retail outlets, private dealerships, provincial cooperative bank branches as well as through the Punjab Agricultural Development and Supplies Corporation.

All insecticides are imported and those manufactured locally contain imported ingredients. These are directly imported by private sector local companies working mostly as dealerships of multinational insecticide manufacturing firms. Currently, two private sector pesticide formulation and manufacturing companies are being organized.

Water being a major input, its surface resources have been developed by the government. However, about a quarter of the total water available at the farm gate is made available by the tubewells in the private sector. The chief concern to the farmer is that the irrigation system is supply driven and farmers have

no control over when water is received, regardless, of the crop needs for water. Consequently, tubewells have been developed to provide water on demand.

### **Crop Price and Procurement Programs**

Crop procurement programs for agricultural commodities were started during the early 1950's. These programs have expanded to cover all major crops including wheat, rice, cotton, and oilseeds such as sunflower, safflower and soybean etc. Procurement programs are also involved but to a lesser extent for potatoes and onions.

The marketing of wheat, rice, cotton, sugarcane are handled largely by specialized agencies and organizations established by the government. The Rice Export Corporation handles rice exports and is responsible for procuring, cleaning, grading and storing as required. Similarly, the Cotton Export Corporation guarantees a minimum seed price to growers, assures supplies to the local textiles industry and looks after most of raw cotton exports. The Pakistan Central Cotton Committee advises the government on various aspects of cotton marketing. The Cotton Board controls the internal trade of cotton and takes policy decisions on cotton exports.

### **Data Collection Programs**

Various government agencies both at the federal as well as provincial level are engaged in data collection. Crop production estimates are prepared by the Crop Reporting Service in Punjab, Bureau of Statistics in Sind and statistical sections of the departments of Agriculture in the provinces of NWFP and Baluchistan. These estimates are sent to the federal Ministry of Food, Agriculture and Cooperatives where these are consolidated. Their publication is a responsibility of the Federal Bureau of statistics. The arrangements for collecting harvest prices are however very weak. Even the work being done in Punjab to collect harvest prices needs to be improved substantially.

Prices of agricultural commodities are collected and disseminated by the following institutions:

Federal MINFA

ALMA National level series data

APCom National level survey data

AMSL National level perishables  
Statistics Division

FBS National level series data  
ACO Census:Agriculture,livestock, Farm Machinery.

Punjab

Bureau of Stats; Provincial series data  
D/O Econ & Mktg; Provincial series data  
Market Committees; Daily market data

Sind

Bureau of Prices  
and Supplies; Provincial Series Data  
Market Committees; Daily Market Data

Most of the data series are collected on a daily, weekly and monthly basis. However, many agricultural commodities experience fundamental seasonal shifts in supply and demand that are not accurately reflected in seasonal variations in reported prices (Rock, Carroll and Kerry Ghee, 1987). In general, flat price trends across a crop season strongly suggest that the true price levels are not being reflected due to either nonrepresentative samples or misquoted prices. The procedures in force for averaging prices over time are also flawed because the price reporting agency does not monitor quantities being sold in various markets at various times.

## **Private Sector Functions**

### **Production**

Agricultural production is almost entirely a private activity in Pakistan. It benefits from public investments in supporting infrastructure and services but responds directly to investments in farm capital. Agricultural technology so far introduced in Pakistan seems to have reached a plateau. Further increases in production will probably be slow and difficult as public policies and investment programs attempt to secure a much wider adoption of the proven technological packages. It will also be useful to improving the technological package. The present technological package is characterized by tractors, cultivators, tubewells, fertilizers, plant protection and improved seed supported by relatively stable prices. This has served usefully in the case of four major crops but the gap between potential and actual achievements is still wide.

The private sector plays a very important role in providing various agricultural inputs. About 39% of indigenous fertilizer is manufactured in the private sector. The importance of a sound seed program capable of supplying quality seed to the farmer cannot be over emphasized. Despite its vital importance, during 1984-85 improved quality seed was only 7.86% of the total seed used and the rest was partially kept by the farmer or purchased from the local market.

### **Transportation**

The private sector makes a large contribution in the transportation of agricultural commodities. In isolated rural areas where means of transportation are defective, farm products are sold in the primary markets. However, these markets are only used for small stocks. Large surpluses are transported to secondary markets. Virtually all transport between villages and markets or villages to sugar mills, cotton ginners and rice husking mills is completely in private carriers. It involves moving about 17 million tons of sugarcane to the mills, 6 million tons of paddy to rice husking mills, about 6 million tons of wheat to procurement centers and markets, about 4 million tons of seed cotton to gins and about 6 million tons of fruits and vegetables to markets and cold stores, and scores of other products as livestock and poultry. This massive transportation operation is carried out by both farmers and other private carriers. Given the current problems of transit delays and damage the system could be substantially improved.

### **Storage Functions**

Farmers and village level merchants have little developed storage capacity. Small marketable surpluses of the scattered small farmers, together with their weak financial position make it difficult for them to withhold produce for better prices. Grains are largely stored in earthen containers, in pots and jute bags or underground pits. It is estimated that the producer gets up to 65% of the consumer price for his non-perishable commodities and 25-55% for the perishables. However, in the case of commodities for which support prices are fixed this proportion may be generally higher. Storage capacities present in the markets can be attributed to the private sector alone. Private sector also carries some credit in providing storage arrangements for the perishables. A number of private firms are engaged in cold storage business.

Government procurement programs for wheat and other major crops hold procurement prices constant throughout the year and the country. This does not allow prices to fluctuate enough to cover either storage or transportation costs. Without an incentive the private development of storage and transportation for major crops is limited.

### **Processing**

The private sector performs a wide range of functions in agriculture business. At present all flour mills are in the private sector. Similarly, rice husking is also done in the private sector. In case of sugarcane, there were 41 sugar mills in the country in 1987 with an annual sugar manufacturing capacity of 171725 metric tons. Out of this, 25 % was produced by the government sector and the rest by the private sector. Other private sector agricultural industries include jute goods, cotton ginning, cotton cloth, tea and cotton yarn manufacturing etc. Milk processing is also the business of the private sector.

### **Trade**

The marketing structure for agricultural produce in Pakistan ranges from marketing arrangements where private enterprise is free to operate to substantial government intervention by way of fixation of floor prices, procurement quotas and prices, export quotas and credit control. A large number of agricultural commodities and livestock products are completely in the hands of the private sector with no restriction on their movement and prices being generally determined by the interaction of supply and demand. Spices and condiments, fruits and vegetables, sugar, pulses, tea, milk and eggs are some examples.

There is generally a lack of proper physical marketing facilities in the private sector. There is an inadequacy of efficient wholesale markets, warehouses and coldstorage space, transport arrangements and processing facilities.

Major private sector exports in 1986/87 were cotton yarn, cotton cloth, cotton thread, cotton waste, fish and fish preparations, hides and skins, raw wool, leather, animal casings and oil cakes. The private sector has an increased role in import of pesticides and the recent years have seen an enormous increase in the use of pesticides. There is very limited involvement of public sector in the import of agricultural machinery.

## **Major Areas of Development Potential**

### **GOP Strategies and Goals**

The government adopted a policy package" for attaining self-sufficiency in agriculture during the Sixth Five Year Plan. The essential components of this package included crop diversification, strengthening the institutional framework, adoption of better agronomic practices and modernization of agriculture". Despite this policy package, the annual growth rate of the agriculture sector, during the period of the Sixth Five Year Plan, (1978-83) was below the target of 4.9 percent. But it is well understood that planned crop diversification and a complete shift to high valued crops and non-traditional oilseeds could not have been achieved during a single plan period. The Seventh Plan is based on the recommendations of the National Commission on Agriculture set up by the government in early 1986. This Plan envisages an annual rate of growth of 4.7% for agriculture during 1988-93. In this period, highest priority will be given "to bridging the gap between the actual and the potential farm yields by the removal of the constraints responsible for this gap. Increases in the level of production would come mainly from higher yields per unit area through use of good quality seed, balanced use of fertilizers, application of gypsum on sodic soils and improvement in efficiency of other agricultural inputs. The agricultural extension system would transmit to the farmers a complete package of crop production technology through on-farm demonstration trials. In livestock production, emphasis would be given to increasing the productivity rather than the number of livestock in order not to further strain the feed and fodder resources of the country. In forestry, the growing demand for fuelwood shall be met through social forestry and energy plantations on private lands".

The strategy to be pursued by the government would maximize comparative advantage on the one hand and guarantee a minimum level of food security on the other. This strategy may not expose the country to the risks inherent in relying heavily on food imports.

### **Business Policy**

Business, trade and domestic price policies with respect to agriculture in Pakistan have been set with a variety of objectives including domestic price stability and protection of the urban poor, protecting the balance of payments,

use of foreign assistance and provision of incentives to industry. The impact of these policies on agriculture has however varied from period to period. Though terms of trade between agriculture and industry have rarely favored agriculture, there have been distinct periods when agriculture suffered negative discrimination in relation to industry. For example, the prices for agricultural commodities in Pakistan during fifties and sixties were only 50 to 60 percent of the world prices at equilibrium exchange rates, when average prices of domestically produced industrial goods were almost 60 percent higher than the international prices. Over the long run however, as discussed earlier, domestic terms of trade between industry and agriculture did not hurt agriculture.

### **Education**

Pakistan's present education system suffers from chronic deficiencies. About 40 percent of the children do not have access to education which has perpetuated the high illiteracy rate during the past forty years. On the other hand, relatively excessive emphasis on higher education in response to urban middle class pressures has produced a mass of unemployable young men while the economy suffers from a shortage of skilled workers and technicians.

The new strategy for the education and training sector emphasizes broadening its resource base, providing access to universal primary education, increasing vocational and technical training facilities and improving quality of education at all levels; but in particular university education. Under the new initiative, universities will be allowed to negotiate foreign assistance and create private chairs. The policy package for opening up private universities includes tax free donations and access to seek foreign assistance.

### **Quality of Infrastructure**

Infrastructure facilities are of basic importance in the development process and their inadequacy constrains the growth prospects significantly. Demand for communication and transport has increased in Pakistan as these are essential inputs in delivering goods to an expanding and wealthier consumer population.

Over the past few years, transport and communication facilities have come under considerable strain both in urban and rural areas. Rapid urbanization and growing transport needs of the rural areas with increased agricultural

production and input needs have made the demand for transport more urgent. However, because of inadequate allocation of funds in the past for infrastructure, the growth of transport and communication facilities has remained sluggish. The country is presently facing a chronic collapse of infrastructure facilities due to the lack of maintenance and overuse. In most cases even heavy financial expenditures have not led to corresponding physical achievements due to the absence of quality control, strict supervision and perhaps corruption. The institutional arrangements for the implementation of these development and maintenance programs need considerable tightening before significant improvements can be seen.

The Seventh Plan envisages an increase of 13,500 kilometers of farm to market roads, construction of 968 kilometers of new roads and improvement of 351 kilometers of existing roads in under developed areas. Telephone availability in rural areas is planned to increase three-fold during the Seventh plan period. As for supply of electricity, it is to be made available to 47 percent of the total population by the year 1992-93 as against the present 35 percent.

### **Government Advancement**

Economic performance in general and particularly in the field of agriculture is influenced by the changes in the global environment, strength of the economy and the effectiveness of public policies. The latter factor i.e. the public policies have to ensure that a social and political framework which is conducive to economic development is provided. Such a framework should show a cogent public sector investment program and a policy framework that is conducive to an appropriate private sector activity.

A most significant challenge to public policy creation as well as its implementation lies in combating the growth of divisive social and political forces within the country which have not been mitigated by economic or other policies. Although democratic institutions have been functioning in the country for some time now, much more is desired in diluting the "feudal" base of political power to achieve greater freedom of expression, encourage social mobility and develop a merit-based social, economic and political order.



# 8 Measuring and Monitoring Changes in the Food and Fiber System

---

## Introduction

A major problem for the government of Pakistan and donor agencies is assessing the "well being" of the agriculture economy or food and fiber system. The Directorate of Agricultural Policy, now the Economic Wing, MINFA has developed two measures for this purpose. The Food and Fiber System or the agricultural economy is bifurcated into farm and forestry, and agricultural business. An index of the production of farm and forestry is established along with associated measures of farm and forestry inputs. An agricultural business production index is established based on data published annually for selected businesses and commodity sectors. Measures of inputs to the agricultural business industry are not available.

## Farm and Forest Production

Due to the importance of farming and forestry to the overall economy and its links to the non-agricultural sectors, it is important and practical to develop measures for assessing the economic health of farming and forestry. In this case, three indexes have been constructed to portray growth in farming and forestry. The first index is developed for production and shows the trends and year to year growth in farm and forest production. The second index is made up of the use of major inputs in farming and forestry and depicts the trend

and year to year expansion or decline in the use of agricultural inputs. Finally, the last index is constructed by dividing the production index by the input use index to show trend and year-to-year change in productivity. Indexes for the farm and forest subsector are as follows: (see table 22)

TABLE 22 FARM AND FOREST PRODUCTION:INDEXES OF INPUTS USED, PRODUCTION AND PRODUCTIVITY

Year	Production	Inputs Used	Productivity
(Price Weighted Index, 1984-85=100)			
1971.72	68.4	74.4	91.9
1972.73	69.4	77.5	89.5
1973.74	72.4	80.5	89.9
1974.75	69.6	80.4	86.6
1975.76	72.0	83.3	86.4
1976.77	75.6	84.8	89.2
1977.78	77.6	88.8	87.4
1978.79	80.9	89.9	90.0
1979.80	83.4	91.6	91.0
1980.81	86.2	94.2	91.5
1981.82	89.6	95.8	93.5
1982.83	94.0	99.0	94.9
1983.84	89.7	99.5	90.2
1984.85	100.0	100.0	100.0
1985.86	105.9	104.9	101.0
1986.87	111.8	106.8	104.7
1987.88	113.0	108.2	104.4
1988.89	118.4	110.7	107.0
<b>% Change</b>			
1971.72-84.85	3.0%	2.3%	0.6%
1984.85-88.89	4.3%	2.6%	1.7%
1971.72-88.89	3.3%	2.4%	0.9%

The index numbers shown here are statistical measures that reduce one or several variables to a common base so that changes overtime can be observed. In this case, farm and forest production has been weighted by 1984-85 wholesale prices for each of the major commodities produced and included in the index. This allows one to add "apples and oranges" by converting

## *Measuring and Monitoring changes in the Food and Fiber System*

production to 1984-85 price units or value. Price weighted production is also the money value of the total volume of the commodity produced. And 1984-85 is considered as the base year.

The production index consists of the production of food grains, pulses, vegetables, meat and fish, milk edible oils, sweeteners, cotton, eggs and forest products weighted by 1984-85 product prices. Each variable from 1971/72 to 1987/88 is shown in Appendix I. The 1984/85 average wholesale price weights are also shown in Appendix I. Growth in the separate variables are as follows. (see table 23)

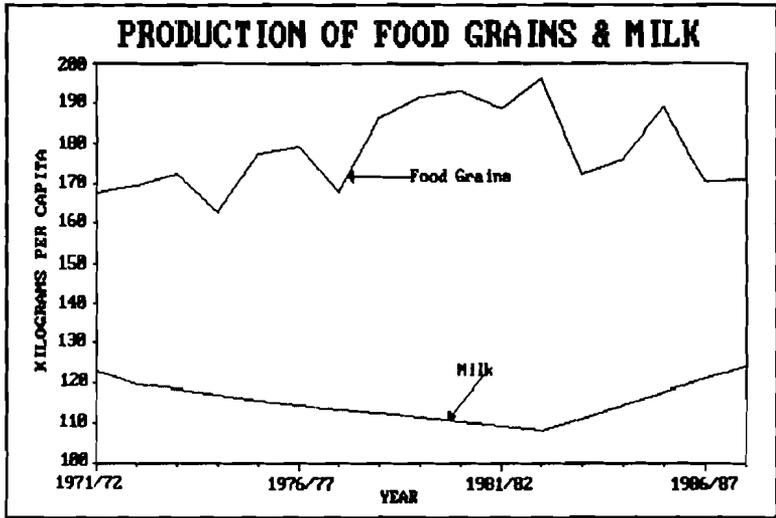
**TABLE 23**                      **GROWTH IN COMMODITY PRODUCTION**  
**INCLUDED IN FARM AND FOREST PRODUCTION INDEX**  
**( Average Per Annum % Change)**

Period:	1971-72 to 1988-89	1984-85 to 1988-89
<b>Commodity:</b>		
Total Food Grains	3.5%	3.5%
Total Pulses	0.6%	1.9%
Vegetables, Including Potatoes	3.2%	6.1%
Major Fruits	4.7%	1.5%
Total Meat and Fish	5.6%	6.0%
Total Milk	3.4%	6.0%
Edible Oils	2.3%	7.5%
Sweeteners	1.9%	-2.7%
Cotton	4.1%	8.7%
Total Eggs	12.5%	1.4%
Timber	1.6%	-0.9%
Firewood	8.2%	0.6%
<b>FARM AND FOREST PRODUCTION INDEX</b>	<b>3.3%</b>	<b>4.3%</b>

The index growth rates shown above indicate that agricultural production, including both farm and forest production, has grown since 1971-72 at 3.7% annually. This compares to a population growth rate of around 3.1% and indicates a growing marketable surplus. Given the price weights used, a large part of the growth was due to growth in cotton production, food grains and milk. Meat and fish, eggs and fruits were supportive but not as significant.

Another method of monitoring farm and forest production is to follow changes in the per capita production of major commodities. For example, food grains

FIGURE 22

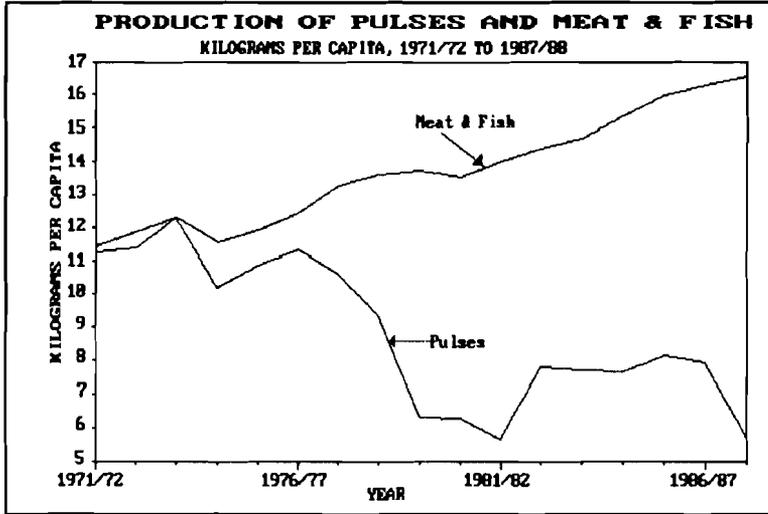


and milk make up about three quarters of the diet by weight and as shown by Figure 22 production of food grains since 1971-72 has been variable but gradually climbing. On the other hand, milk production per capita was declining until 1982-83 when according to the Livestock Division, estimates of MINFA production per cow and the number of cows in production began increasing.

As discussed earlier food consumption trends indicate that consumption is shifting to meats, fruits and vegetables. As shown by Figure 23 the production of meat and fish per capita have been progressing rapidly. Both fish and poultry production per capita are pushing the per capita production of meat upwards. Poultry production has been a favorite investment for returning overseas workers. Fish are the result of expanding fishing fleets and wider areas fished. The second largest growth is the result of mutton production consisting of both sheep and goats. Herds of goats and sheep are often owned by landless farmers and are grazed on government land or along road sides

and field corners. In addition, beef production has been advancing as tractorization has progressed and oxen are sold off for slaughter. Currently, beef production is being supported by increased buffalo cow numbers that have been kept for milk production.

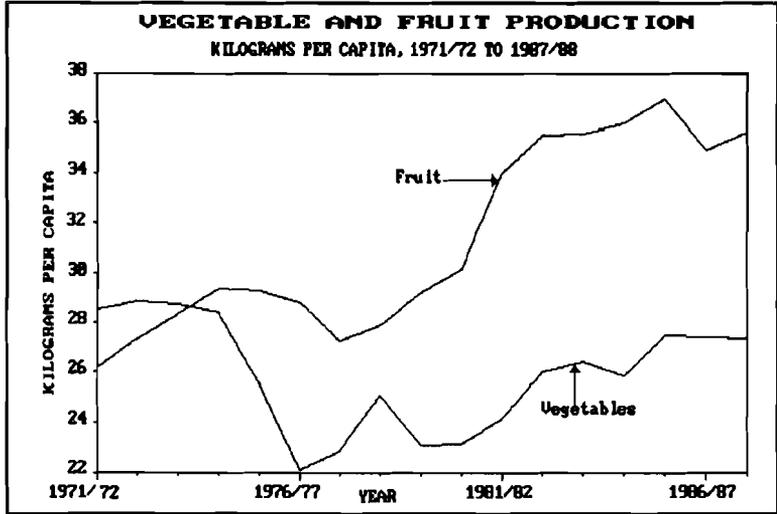
FIGURE 23



Pulses are a perplexing problem because production continues to fall despite rising prices. In addition they are thought to be the "poor man's protein" in that the protein in pulses compliments that in wheat and other food grains. Pulses are largely a dryland crop and higher prices maybe necessary to attract additional production on irrigated land. To alleviate the situation some small amounts of pulses are being imported.

Fruit production per capita is advancing on the basis of orchards that were largely planted during the 1970's so that their production is being realized during the 1980's. The advancement in fruit production will likely continue since new orchards are being planted yearly. The new plantations are largely in the North West Frontier Province, in the Quetta area in Baluchistan and

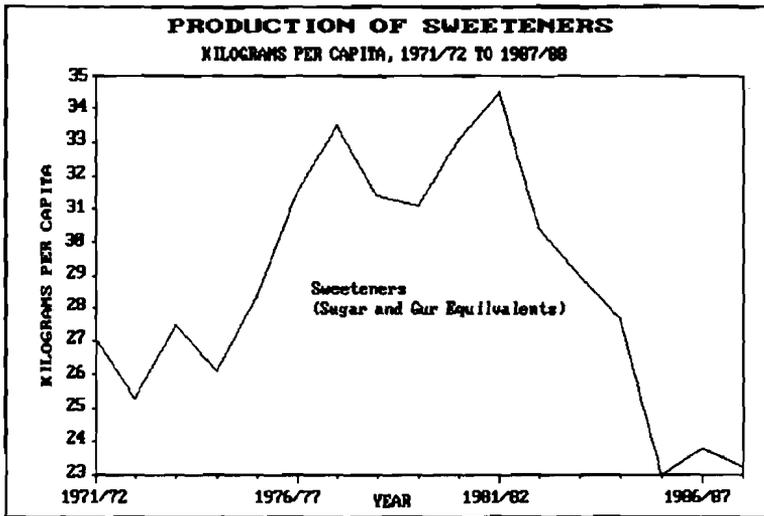
FIGURE 24



in the Multan area in the Punjab. Vegetable production is a different picture as shown by Figure 24. Vegetable production per capita has been increasing since 1977-77 but it is still less than the levels achieved in the early 1970's. Vegetable production has advanced with prices but is held back by transport and marketing problems. Summer vegetables often rot before reaching markets.

Another problem area is the production of sweeteners. As shown in Figure 25 per capita sweetener production has declined rapidly since 1981/82. This has occurred because yields of sugar cane have not advanced for a long period of time. Almost all sweeteners are derived from sugar cane. Two companies produce corn sweeteners and are growing but sugar substitutes are not a significant part of the sweetener market. More recently sugar prices have been deregulated and despite the high rate of taxation may become explosive. The sugar milling industry is having a number of problems adjusting to the market economy for sugar because to this point they have not had to compete for sugar cane nor for a sugar market.

FIGURE 25



Although not shown here the per capita production of edible oil has improved substantially since 1983-84 due to a revival of cotton and cottonseed production. Cotton production advanced rapidly due to the adoption of pesticides that were not available earlier due to import restrictions and the privatization of the ginning industry so that a wider market for seed cotton was available to the farmer. This occurred as world and Pakistan prices increased.

## **Farm and Forest Input Use**

The index of farm and forest inputs was developed in the same manner as the farm and forest production index. Each input is weighted by the 1984/85 price or cost of the input. Farm inputs in the index are not inclusive but they are the major inputs commonly reported by the Ministry of Food, Agriculture

and Cooperatives and the Federal Bureau of Statistics. For the most part, the input index is made up of the major inputs used by the farm and forest sector including farm labor, irrigation water, fertilizers, pesticides, improved seeds, tube wells, tractors, credit disbursed, and crop and forest acreage. The following table (26) shows the growth rates in each of the inputs used in the index. Appendix I shows values for each input from 1971-72 to 1987-88 and the price weights used.

TABLE 26 GROWTH IN MAJOR FARM AND FOREST INPUTS USED IN THE FARM INPUTS INDEX  
(Average per Annum % Change)

	Period:	
	1971-72 to	1984-85 to
Farm Input:	1988-89	1988-89
Farm labor force	2.2%	2.9%
Water availability	2.9%	2.8%
Fertilizer off Take	9.6%	9.4%
Pesticide imports	7.0%	-16.6%
Improved seed distribution	8.6%	1.6%
Tractor inventory	5.5%	2.0%
Credit disbursed	32.3%	11.4%
Total cropped area	1.4%	1.4%
Total forest area	0.7%	-0.9%
INDEX OF FARM INPUTS USED	2.4%	2.6%

As shown by the above table the growth in farm inputs is largely due to increases in total cropped area, water availability and labor because of the proportional weight on cropped area, water availability and labor. In addition growth has been supported by credit disbursed and fertilizer offtake. Other factors are important but not so heavily weighted.

## **Farm and Forest Productivity**

The farm and forest productivity index is the ratio of the production index to the input index and is intended to represent output per unit of input. Productivity is important in maintaining the growth rates of farm and forest production above the 3.1% gains in the population. The rising productivity level in Pakistan seems to be the result of the introduction of improved

technology packages. This group of technologies includes, improved seeds, tractorization, mechanized harvesting, on demand tubewell water, fertilizer, pesticides and available credit. Productivity in the farm and forest sector, measured in this manner, has been trending upwards at about 1.5% per annum since 1971-72. More recently the trend has increased to about 2.5% per year due largely to gains in cotton, meat and fish, and milk production. (see table 27)

TABLE 27 SUMMARY OF GROWTH IN FARM AND FOREST INDEXES OF PRODUCTION, INPUT USE AND PRODUCTIVITY (Average Annual % Growth)

Index:	1971-72	1984-85
	to 1988-89	to 1988-89
Production	3.3%	4.3%
Input use	2.4%	2.6%
Productivity	0.9%	1.7%

Besides the broad index measures of farm and forest production and productivity, more specific measures as crop yields per hectare are also used. For example crop yields are compared to those in other countries located in similar cropping zones. As shown in the following table crop yields in Pakistan generally lag behind those in other countries.(see table 28)

TABLE 28 YIELDS OF MAJOR CROPS (1985-86)

Crop	India	Turkey	Mexico	Pakistan
	(Kgs. Per Hectare)			
Wheat	2032	1900	4179	1881
Cotton	535	2169	2732	1545
Sugar Cane	59845	-	-	35722
Maize	1207	3276	1783	1256
Rice	2179	-	-	2350

Government of Pakistan, Ministry of Food, Agriculture and Cooperatives, Food and Agriculture Division (Planning Unit), Agricultural Statistics of Pakistan 1986, Vol. I, Islamabad, Pakistan, April 14, 1988.

In brief, these general indexes of the economic health of agriculture are developed to include indexes of (1) farm and forest production, (2) input use, and (3) productivity. These indexes indicate rising agricultural production since 1971-72 which appeared to be most crops and livestock production with

the exception of pulses and vegetables. This is also the case for the more rapid growth during the last four years, however, cotton production growth was more pronounced during this period. In addition, it appears that the long term growth in production since 1971/72 was due to both increased and more efficient use of inputs.

## **Agricultural Business Production**

The Index of Agricultural Business Production is made up of selected production in the food and fiber system and weighted by the gross price margin. For example seed cotton ginned is weighted by the gross price margin or the difference between the value of lint and cotton seed from a ton of seed cotton purchased for ginning. Ginning is a service and the price of the service per ton of seed cotton ginned is the gross price margin. Selected production sectors in the index include food manufacture, tobacco manufacture, fiber processing and textile manufacture, farm input manufacture and credit disbursement and forest products. Values for each production sector from 1971-72 to 1987-88 are shown in Appendix II. (see table 29)

The Agricultural Business Production Index varies significantly from year to year but the trend is generally positive. The upward trend has been supported by animal slaughter, vegetable processing, beverage production, cotton ginning and yarn production, jute textile production, fertilizer production, tractor assembly and credit disbursed. The index expansion is held down by negative growth in the production of firewood, tube wells, woolen fabrics and cotton cloth. Growth in each production sector is summarized in the following table (30).

Values for each of the business activities above are shown in Appendix II. The gross margin weights are also shown in Appendix II. Gross margins for 1984/85 are used for weights rather than prices because most of the agricultural business activities are essentially services and the margin is essentially the price for the service. The gross margin is defined as the value of the finished products that are sold minus the raw products that are purchased for the process.

*Measuring and Monitoring changes in the Food and Fiber System*

TABLE 29 AGRICULTURAL BUSINESS PRODUCTION:  
INDEXES OF FARM AND FOREST PRODUCTION, AND  
AGRICULTURAL BUSINESS PRODUCTION  
AND PRODUCTIVITY

Year	Agricultural and Business Production [2]	Farm and Forest Production [1]	Agricultural Business Productivity And Growth In Services
_____ (Index, 1984/85=100) _____			
1971.72	57.4	68.4	83.9
1972.73	58.5	69.4	84.3
1973.74	61.1	72.4	84.4
1974.75	58.8	69.6	84.5
1975.76	60.8	72.0	84.4
1976.77	63.9	75.6	84.5
1977.78	67.9	77.6	87.5
1978.79	70.4	80.9	87.0
1979.80	76.6	83.4	91.8
1980.81	83.0	86.2	96.3
1981.82	89.0	89.6	99.3
1982.83	92.6	94.0	98.5
1983.84	91.3	89.7	101.8
1984.85	100.0	100.0	100.0
1985.86	101.9	105.9	96.2
1986.87	111.1	111.8	99.4
1987.88	118.6	113.0	105.0
1988.89	118.9	118.4	100.4
<b>% Change</b>			
1971.72-84.85	4.4%	3.0%	1.4%
1984.85-88.89	4.4%	4.3%	0.1%
1971.72-88.89	4.4%	3.3%	1.1%

[1] Price weighted index, 1984-85=100

[2] Gross margin weighted index, 1984-85=100.

TABLE 30 GROWTH IN THE PRODUCTION SECTORS. OF AGRICULTURAL BUSINESS  
PRODUCTION INDEX  
(Average Annual % Change)

Period:	1971-72 to 1988-89	1984-85 to 1988-89
Food Manufacture:		
Apparent Wheat Ground into Flour	4.7%	5.0%
Apparent Rice Milled	2.9%	-1.4%
Oilseed Crushed	3.7%	9.0%
Vegetable Ghee Produced	8.2%	-0.8%
Meat & Fish Slaughter and Processing	5.6%	5.9%
Milk Distribution and Processing	3.4%	6.0%
Sweeteners Produced	2.8%	1.0%
Tea Blended	3.8%	4.1%
Beverages Produced	10.8%	5.0%
Tobacco Manufacture:		
Cigarettes Produced	2.5%	-4.0%
Fiber Processing and Textile Manufacture:		
Cotton Ginned	4.1%	8.7%
Cotton Yarn Produced	4.8%	14.7%
Woolen Fabric Produced	-1.6%	1.9%
Jute Textile Production	7.3%	6.4%
Farm Input Manufacture:		
Chemical Fertilizer Production	11.0%	3.7%
Tubewell Production	-3.6%	5.4%
Tractor Production	12.6%	-3.7%
Feed Mixed	3.1%	4.6%
Credit Disbursed	32.3%	11.4%
Forestry Products:		
Paper & Paper Board Production	3.3%	-3.4%
Timber Production	1.6%	8.2%
Firewood Production	-0.9%	.1%
AGRICULTURAL BUSINESS	4.4%	4.4%

The decline in the cotton cloth industry is largely an anomaly of data collection. The data shown here are for the "organized" industry of more than four looms per factory. Smaller factories of four looms or less are not taxed and their production is not monitored. However, at this time the industry overall is having difficulty competing in the world market. Advantages of scale are lost and quality control is difficult. At this point it appears that the industry is not able to compete with the more modern industries in the East, especially Japan and Taiwan.

Overall, agricultural business production, measured in this way, has not increased as rapidly as farm and forest production, except for the last three years from 1984-85 to 1987-88. During the early seventies investment in agricultural business declined because of the nationalization of selected industries and the ensuing fear of capital loss. After that investors have slowly regained confidence. In addition more recently price controls and other regulations have been relaxed and businesses are now learning how to operate in a market economy. Many business have only sold to the government before and haven't any experience in storing, distributing and marketing their products. In fact a number of industry groups have asked the government to restore price controls and procurement.

Overall measures of productivity in agricultural business have not been developed here since information on inputs used are not available. However, measures of productivity in agricultural business are usually specific to the industry, for example, in the sugar processing industry the recovery rate of available sugar in sugar cane is about 78% compared to the industry standard of 85%-92%. In the poultry industry the broiler production to feed ratio is around 1.9 compared to the industry standard of around 1.5. In the dairy industry Ultra High Temperature treated milk has to be supplemented with dry powder milk to meet solid content standards. Other agricultural businesses as the fertilizer industry are undergoing "debottle necking" so that more throughput can be obtained and changing conversion systems so that natural gas is converted to ammonia gas with less energy expended. The textile industry is converting to power looms and machinery that uses short staple cotton. These measures are important indicators of gains in productivity for single industries but are not necessarily representative of all agricultural business.

### Agricultural Business Productivity and Growth in Services

TABLE 31

SUMMARY OF GROWTH IN AGRICULTURAL BUSINESS  
PRODUCTION, AND PRODUCTIVITY AND GROWTH IN SERVICES  
(Average Annual % Growth)

	1971-72 to 1988-89	1984-85 to 1988-89
Index:		
Production	4.4 %	4.4%
Farm and Forest production	<u>3.3%</u>	<u>4.3%</u>
Productivity and growth in services	1.1%	0.1%

# REFERENCES

---

- Alderman, Harold. *The Impact of Changes in Income and Schooling on the Demand for Food Quantity and Quality in Rural Pakistan*. Background paper for Food Security Management Project in Pakistan. Islamabad, 1988.
- Alderman, Harold and Salim Chishti. *Determinants of Household and Market-Oriented Activities of Rural Women in Pakistan*. Background paper for the Rural Food Security Project, International Food Policy Research Institute. Islamabad, October 1988.
- Alderman, Harold, Salim Chishti, Marito Garcia, Ijaz Majid and Muhammad Sarwar. *Household Food Security in Rural Pakistan: Background Descriptive Data from Selected Districts in Pakistan*. Draft report. Islamabad, September 1988.
- Alderman, Harold, M. Ghaffar Chaudhry, Marito Garcia. *Household Food Security in Pakistan: The Ration Shop System*, Working Papers on Food Subsidies, Number 4, Report prepared for the U.S. Agency for International Development by the International Food Policy Research Institute. Islamabad, May 1987.
- Alderman, Harold. *The Choice of Health Care Providers for Children's Illnesses in Urban Pakistan and the Implication of User Fees*. Draft report submitted to the U.S. Agency for International Development. Islamabad, September 1988.
- Ali, Mubarak and J. C. Flinn. *Profit Efficiency Among Basmati Rice Producers in Pakistan Punjab*. " *American Journal of Agricultural Economics*". 71(2). May 1989:303:310.

- Ali, Mubarik. *Supply Response of Major Crops in Pakistan: A Simultaneous Equation Approach*. Special Report Series No. 11. Islamabad: Economic Analysis Network Project, April 1988.
- Ali, Mubarik, Derek Byerlee and *Economic Efficiency of Small Farmers in a Changing World: A Survey of Recent Evidence*. "Journal of International Development". (forthcoming).
- Ali, Mubarik, Forrest Walters, Rao Shaffiq-Ur-Rehman, *The Relative Contribution of The Food and Fiber System In Pakistan*, Draft Report prepared by the Directorate of Agricultural Policy, Food and Agricultural Division, MINFA and the Economic Analysis Network Project, US AID, Islamabad, March, 1989.
- Altaf, Zafar, *Rural Income Augmentation is no longer a function of land. It is a function of the mind*, "The Econogram", Pakistan Economic Analysis Network Project, June 1988.
- Anjum, Muhammad, S. *Policy Briefing Paper on Wheat*. Unpublished report for the Directorate of Agricultural Policy, Ministry of Food, Agriculture and Cooperatives, government of Pakistan. Islamabad, 1987.
- Anjum, Muhammad S. *Maintaining Self-Sufficiency or Exports: A Policy Perspective on Pakistan Wheat*. Unpublished report. Islamabad, 1987.
- Anjum, Muhammad, S. , Stanly Krause, Kamil Lodhi, Agha Abbas Raza and Forrest Walters, *The Pakistan Dairy Industry, Issues and Policy Alternatives*, Special Series Report No. 14, Economic Analysis Network Project, July 1989.
- Avery, Dennis T. Statement Given to the Senate Subcommittee on Foreign Agricultural Policy. June 3, 1986.
- Ayers, H. D. , A. G. Bennett, G.L. Calver, E. H. Hobbs, J. J. Kennelly, H. H. Khan, E. L. Menaie, M.S. Pal. *Agriculture in Pakistan: A Review of Performance and Prospects*. A report prepared for Canadian International Development Agency, October, 1985.

- Bajwa, M. I. *Phosphorus in Pakistan Agriculture*. Paper presented at UNIDO-NFC Regional Consultation on Phosphatic Fertilizers, held on October 17-20, 1988.
- Chaudhry, M. Aslam. *Production and Marketing of Wheat Seed in Punjab*. Special Report Series No. 7. Islamabad: Pakistan Economic Analysis Network Project, 1988.
- Chaudhry, M. Aslam. *Rationalization of Irrigation Water Charges in Pakistan: Answers to Some Policy Questions*. Special Report Series No. 9, Islamabad: Pakistan, Economic Analysis Network Project, November 1988.
- Chaudhry, M. Aslam and Mubarak Ali. *Economics of Past and Prospective O & M Investments In The Canal Irrigation System In Pakistan's Punjab*. Special Report Series No. 10, Islamabad: Pakistan, Economic Analysis Network Project, December, 1988.
- Chaudhry, M. Aslam and Robert A. Young, *Privatization of SCARP Tubewells: Economic Issues and Policy Alternatives*, report under review, Islamabad: Pakistan, Economic Analysis Network Project, March 1989.
- Cornelisse, Peter A. , and Bart Kuijpers. "On the Optimal Size of Buffer Stock-the Case of Wheat in Pakistan. *Pakistan Development Review* 24, pp. 335-348, Islamabad, 1985.
- Pakistan Fertilizer Policy: Review and Analysis*. Islamabad: Chemonics International Consulting Division in collaboration with the United States Agency for International Development. Islamabad, January 1985.
- Port Facilities and Handling Overview, Inland Transportation and Handling Overview, Bulk Vs. Bagging Comparison*. Compendium of Speaker Presentations. U.S. Feed Grains Council, Grain Handling and Quality Workshop. Lahore, September 25-26, 1988.
- Dorosh, Paul. *Exchange Rate and Trade Effects on Relative Prices in Pakistan*. Draft Working Paper. Islamabad, September 9, 1988.

- Dove, Michael R. *Prospects for Farm Forestry on Rainfed Versus Irrigated Farms: Punjab, NWFP, Baluchistan*. Islamabad: Office of the Inspector General of Forests and Winrock International Technical Assistance Team, November 1987.
- Dove, Michael R. *Village-Level Factors Affecting Interest in Farm Forestry: Punjab, NWFP, Baluchistan*. Islamabad: Office of the Inspector General of Forests and Winrock International Technical Assistance Team, August 1987.
- Dove, Michael R. *Prospects for Wood-Dung Fuel Replacement Through Farm Forestry Development: The Punjab, NWFP, Baluchistan*. Islamabad: Office of the Inspector General of Forests and Winrock International Technical Assistance Team, November 1987.
- Ender, Gary. *Government Intervention in Pakistan's Agricultural Economy in the Context of the Uruguay Round*. Unpublished report. Islamabad, 1987.
- Energy Conservation in Agricultural Sector*. Islamabad: The National Energy Conservation Center (ENERCON), 1987.
- Flinn, J. C. and Mubarik Ali. "Technical Efficiency in Basmati Rice Production. *Pakistan Journal of Applied Economics*, Vol. 5, No 1. Summer 1986.
- Garcia, Marito. *Determinants of Farm Earnings: A Study of Five Districts in Rural Pakistan*. Background paper for Food Security Study in Rural Pakistan. Islamabad, October, 1988.
- Herdt, Robert W. *Increased Crop Yields in Developing Countries: Sense and Nonsense*. Paper presented to the meeting of the American Agricultural Economics Association July 30-Aug 3, 1988. Knoxville, Tennessee.
- Hobbs, Peter, Bakht Khan, Abdur Razzaq, Bakht Khan, Mohammad Aslam, Naeem Hashmi, Abdul Majid. *Results from Agronomic on-Farm Trials on Barani Wheat in the High and Medium Rainfall Areas of Northern Punjab for 1983-1985*. Wheat Paper No. 86-8. Islamabad: PARC\CIMMYT, 1986.

- Khan, Abdur Rahman, *Comparative Advantage Should Form the Basis for the Country's Agriculture Policy*, "The Econogram", Pakistan Economic Analysis Network Project, October 1988.
- Khawaja, Iffat and M.I. Bajwa. "Fertilizer Demand Projections 1985-86 to 1999-2000." *Journal of the University of Baluchistan*. Vol. 5, No.1, 1986.
- Lodhi, Kamil. *The Pakistan Sugar Industry: An Economic and Policy Analysis*. Special Report Series No. 8. Islamabad: Pakistan Economic Analysis Network Project, October 1988.
- Lybecker, Donald W. and Melvin D. Skold. *Economic Analysis of the Agricultural Production Sector for Policy Formulation*. Special Report Series No. 5. Islamabad: Pakistan Economic Analysis Network Project, May 1988.
- Malik, Sohail J. *The Source Structure and Utilization Patterns of Rural Credit in Pakistan: Implications For Policy*.
- Mabbs-Zeno, Carl and Renato Penn. *Estimates of Producer and Consumer Subsidy Equivalents, government Intervention in Agriculture, 1982-1986*. New York: United States Department of Agriculture, 1988.
- McKean, John, Forrest Walters, Mubarik Ali and Garth Taylor. *A Guide to Interindustry Analysis of Pakistan Economy*. Special Report Series No. 3. Islamabad: Pakistan Economic Analysis Network Project, February 1988.
- Mellor, John. *Agricultural Development Opportunities for the 1990s*. Address Presented at International Centers Week of the Consultative Group on International Agricultural Research, Washington D. C. , November 4, 1988.
- Morgan, Larry. *How to Improve Market Stability, Lower Import Costs and Save on Foreign Exchange in the Edible Oils Trade*. Islamabad: United States Agency for International Development, 1985.
- Report of the National Commission on Agriculture*. Islamabad: Ministry of Food, Agriculture, and Cooperatives, March 1988.

- Pakistan's Edible Oilseeds Industry.* Islamabad: United States Department of Agriculture, in collaboration with the United States Agency for International Development March 1987.
- Pakistan Poultry Databook.* Special Reports Series No.6. Islamabad: Economic Analysis Network Project, 1988.
- The Pakistan Poultry Industry: A Policy Analysis Framework.* Special Report Series No. 1. Islamabad: Pakistan Economic Analysis Network Project, 1987.
- Pinckney, Thomas C. , *Stabilizing Pakistan's Supply of Wheat: Issues In the Optimization of Storage and Trade Policies*, Unpublished paper, International Food Policy Research Institute, Islamabad, 1987.
- Pinckney, Thomas C. , Naved Hamid, Marshall Klaus, and Alberto Valdes. *Wheat Storage Policy in Pakistan: Implications of Price Policy and Production Instability.* Islamabad: International Food Policy Research Institute, May 1988.
- Planning Commission, government of Pakistan. *Seventh Five Year Plan 1988-93 and Perspective Plan 1988-2003.* Islamabad: government of Pakistan, 1988.
- Proceedings of the Seed Industry Seminar.* New York: Industry Council for Development, April 7-9, 1987.
- Rock, Carroll and Kerry Gee. *An Appraisal of Agricultural Price Statistics in Pakistan.* Special Report Series No.2. Islamabad: Economic Analysis Network Project, 1987.
- Saqib, Sarwar. *Assessment of Energy Use and Potential for Energy Conservation in Pakistani Agriculture.* Unpublished paper presented at the International Energy Conservation Symposium, Islamabad October 30-31, 1988.
- Scott, William and David A. Redding. *Agricultural Credit in Pakistan.* Islamabad: USAID, March 1988.

- Seckler, David. *Growth and Stagnation in Pakistan Agriculture*. Unpublished report submitted to USAID/Pakistan, 1987.
- Seckler, David, Ali M. Chaudhary, Bashir Ahmed and Majid Hassan Khan. *Agricultural Development in Pakistan: A Report to the USAID Mission, Islamabad, February 1987*.
- Sharif, Muhammad, Muhammad Shafique, Zulfiqar Ahmad, Jim Longmire and Muhammad Azeem. *Rice Varietal Adoption in the Rice Zone of the Punjab: Results from 1988*. AERU Faisalabad Staff Paper No. 88-7, 1988.
- Akhtar, M. Ramzan, Zulfiqar Ahmad and Khaleel A. Tetlay. *Monitoring Wheat Varietal Diffusion in the Irrigated Punjab: Results from 1986-1987*. AERU Faisalabad Staff Paper No. 87-3, 1987.
- Sharif, Muhammad and Zulfiqar Ahmad, Muhammad Shafique, M. Asim Maqbool and Jim Longmire. *Monitoring Wheat Varietal Diffusion in the Irrigated Punjab: Results from 1987-88*. Islamabad: Pakistan Agricultural Research Council (PARC) 1988.
- Sheikh A. D. , Derek Byerlee and M. Azeem. *Analytics of Barani Farming Systems of Northern Punjab; Cropping Intensity, Crop-Livestock Interactions and Food Self-Sufficiency*. Islamabad: PARC\CIMMYT, 1988.
- Smale, Melinda, Khalida Perveen, M. Shafiq-ur-Rehman, Maqsood Ahmed Hussain, M. Asim Maqbool. *Wheat Harvest Technology in Punjab's Rice Wheat Zone: Combines, Laborers and the Cost of Harvest Delay*. PARC/CIMMYT Paper No. 87-23. Islamabad: CIMMYT/PARC, 1987.
- Tetlay, Khaleel A. , Paul W. Heisey, Zulfiqar Ahmad, *Seed Technology Acquisition, Seed Industry Contact and on-Farm Seed Management in the Irrigated Punjab: Farmers Behavior and Perceptions*, PARC/CIMMYT Paper No. 87-25. Islamabad: PARC/CIMMYT Collaborative Programme, 1987.

- Timmer, Carol, W. *Agriculture and Structural Change: Policy Implications of Diversification in Asia and the Near East*. Background paper for the USAID/ANE Conference on Agriculture in the 1990s. Washington, D. C. September 6-10, 1988.
- Timmer, Peter, C. *Agricultural Prices and Stabilization Policy*. Draft report for Harvard Institute for International Development. August 1988.
- Timmer, Peter, C. *The Role of Agriculture in Employment Generation and Income Distribution in Asia and the Near East*. Draft Report for Harvard Institute for International Development. August 1988.
- United States Department of Agriculture, Economic Research service, Agriculture and Trade Analysis Division. *Estimates of Producer and Consumer Subsidy Equivalents, government Intervention in Agriculture, 1982-86*. Staff Report No. AGES880127. Washington, D. C. April, 1988.
- Walters, Forrest, Khalil Sattar and Agha Sajjad Haider, *The Pakistan Poultry Industry: A Policy Analysis Framework*. Special Report Series No. 1. Islamabad: Economic Analysis Network Project, 1987.
- Walters, Forrest. *The Pakistan Economy: Examples from Input-Output Analysis*. Briefing paper, Directorate of Agricultural Policy, Ministry of Food and Agriculture, government of Pakistan and Economic Analysis Network Project, Islamabad, 1988.
- Walters, Forrest, Thurston Teele, Anthony Ward, and Khaliq-ur-Rehman, *Pakistan Fertilizer Policy: Review and Analysis*. Islamabad: Chemonics International Consulting Division in collaboration with the United States Agency for International Development. Islamabad, January 1985.
- Wennergren, E. Boyd, Charles H. Antholt, Morris D. Whitaker. *Agricultural Development in Bangladesh*. Boulder, Colorado: Westview Press, 1984.

Zulfiqar Ahmad, Muhammad Sharif, Jim Longmire and Khaleel A. Tetlay.  
*Weed Management Strategies for Wheat in the Irrigated Punjab:  
Farmers' Knowledge, Adoption and Economics.* PARC/CIMMYT  
Paper No. 88-3. Islamabad: PARC\CIMMYT, 1988.

# Appendix I

## FARM AND FOREST PRODUCTION: INDEXES OF INPUTS USED, PRODUCTION AND PRODUCTIVITY

Year	Production Used	Inputs Used	Productivity
(Price Weighted Index, 1984/85=100)			
1971.72	68.4	74.4	91.9
1972.73	69.4	77.5	89.5
1973.74	72.4	80.5	89.9
1974.75	69.6	80.4	86.6
1975.76	72.0	83.3	86.4
1976.77	75.6	84.8	89.2
1977.78	77.6	88.8	87.4
1978.79	80.9	89.9	90.0
1979.80	83.4	91.6	91.0
1980.81	86.2	94.2	91.5
1981.82	89.6	95.8	93.5
1982.83	94.0	99.0	94.9
1983.84	89.7	99.5	90.2
1984.85	100.0	100.0	100.0
1985.86	105.9	104.9	101.0
1986.87	111.8	106.8	104.7
1987.88	113.0	108.2	104.4
1988.89	118.4	110.7	107.0
<b>% Change</b>			
1971.72-84.85	3.0%	2.3%	0.6%
1984.85-88.89	4.3%	2.6%	1.7%
1971.72-88.89	3.3%	2.4%	0.9%

TOTAL FARM AND FOREST PRODUCTION IN PAKISTAN [1] [2] [3]  
1971/72 TO 1987/88

YEAR	TOTAL FOOD GRAINS (000) Ton	TOTAL PULSES	VEGETAB- LES INC.POTA.	MAJOR FRUITS	TOTAL MEAT & FISH	TOTAL MILK
1971.72	10632	712	1810	1661	723	7800
1972.73	11193	750	1902	1803	783	7899
1973.74	11720	836	1954	1926	837	8044
1974.75	11403	715	1990	2060	810	8193
1975.76	12831	784	1845	2112	858	8348
1976.77	13341	844	1643	2142	926	8524
1977.78	12861	812	1754	2090	1017	8704
1978.79	14719	736	1979	2203	1076	8888
1979.80	15592	512	1881	2381	1119	9075
1980.81	16188	526	1944	2532	1135	9267
1981.82	16319	488	2093	2942	1212	9462
1982.83	17491	694	2321	3171	1284	9662
1983.84	15854	710	2427	3269	1353	10242
1984.85	16692	726	2450	3414	1458	10856
1985.86	18462	797	2684	3609	1573	11500
1986.87	18082	801	3047	3638	1650	12198
1987.88	17471	548	3081	3586	1747	12900
1988.89	19166	783	3100	3630	1837	13706
% Change						
1971.72-88.89	3.5%	0.6%	3.2%	4.7%	5.6%	3.4%
1984.85-88.89	3.5%	1.9%	6.1%	1.5%	6.0%	6.0%

- [1] government of Pakistan, Finance Division, Economic Advisor's Wing, Economic Survey 1987-88, Islamabad, July 1988.
- [2] government of Pakistan, Ministry of Food, Agriculture and Cooperatives, Planning Unit, Agricultural Statistics of Pakistan, 1987-88, Islamabad, December 1988.
- [3] The index is developed from price weighted production. Production is weighted by 1984-85 prices of major commodities.

TOTAL FARM AND FOREST PRODUCTION IN PAKISTAN  
1971-72 TO 1987-88 (Continued)

YEAR	EDIBLE	SWEET-	COTTON	TOTAL	TOTAL FOREST	
	OILS	ENERS.			EGGS	TIMBER
	(000) Ton	(000) Ton	(Mil.)	(Mil.)	(Million Cubic Feet)	(Million Cubic Feet)
1971.72	242	1715	707	583	11.8	19.2
1972.73	234	1670	702	695	8.8	17.0
1973.74	222	1865	659	811	11.2	16.7
1974.75	197	1824	634	907	6.2	11.6
1975.76	179	2049	514	1159	6.0	11.4
1976.77	170	2349	435	1443	8.4	19.4
1977.78	183	2565	575	1557	4.6	16.2
1978.79	162	2481	473	1805	8.1	20.4
1979.80	175	2531	728	2094	8.2	15.3
1980.81	211	2756	715	2319	6.4	15.8
1981.82	215	2986	748	2664	5.1	17.1
1982.83	230	2707	824	3200	7.4	16.8
1983.84	157	2664	495	3619	6.0	12.3
1984.85	267	2627	1008	4093	11.3	16.1
1985.86	306	2250	1208	4630	11.1	13.6
1986.87	322	2401	1309	4954	14.4	19.2
1987.88	362	2410	1468	4140	15.0	16.0
1988.89	357	2350	1406	4320	15.5	16.5
% Change						
1971.72-88.89	2.3%	1.9%	4.1%	12.5%	1.6%	-0.9%
1984.85-88.89	7.5%	-2.7%	8.7%	1.4%	8.2%	0.6%

**AGRICULTURE  
PRODUCTION  
INDEX [2]**

<b>YEAR</b>	<b>1984/85=100</b>
1971.72	68.4
1972.73	69.4
1973.74	72.4
1974.75	69.6
1975.76	72.0
1976.77	75.6
1977.78	77.6
1978.79	80.9
1979.80	83.4
1980.81	86.2
1981.82	89.6
1982.83	94.0
1983.84	89.7
1984.85	100.0
1985.86	105.9
1986.87	111.8
1987.88	113.0
1988.89	118.4
<b>% Change</b>	
1971.72-88.	3.3%
1984.85-88.	4.3%

COMMODITY PRICES [1] [2]  
1984/85

PRICE DESCRIPTION	UNIT	VALUE	VALUE	WEIGHT
		PER UNIT	PER TON [3]	ADJUST- MENT
		Rupees		
Average Wholesale Price:				
Wheat F.A.Q.	40 Kg.	83.69	2092	1
Masoor, Split, F.A.Q. [2]	40 Kg.	366.61	9165	1
Tomatoes, F.A.Q., Lahore[2]	40 Kg.	183.75	4594	1
Kino, Lahore, F.A.Q. [2]	Metric Ton	1485.00	1485	1
Beef	40 Kg.	473.47	11837	1
Milk, Faisalabad [2]	40 Kg.	140.20	3505	1
Vegetable Ghee	40 Kg.	555.36	13884	1
Refined Sugar (Ration Shop)	40 Kg.	310.00	7750	1
Cotton NT Sind RG	40 Kg.	574.11	14353	1
Eggs	1000	527.00	527	1
Timber, Shesham, Karachi [2]	CU. M, FT	3266.64	93	2500
Firewood: Mixed Dry, Peshawar	40 Kg.	33.41	11	20000

[1] government of Pakistan, Finance Division, Economic Advisor's Wing, Economic Survey 1987-88, July, 1988, Islamabad, Pakistan.

[2] government of Pakistan, Federal Bureau of Statistics, Statistics Division, Pakistan Statistical Yearbook 1987, May, 1987, Karachi, Pakistan.

[3] All prices are converted to Rupees per metric tons except those for eggs and timber. Egg prices are Rupees per 1000 and Timber and firewood prices are in Rupees per cubic meter and foot.

## PROPORTIONAL WEIGHT IN THE 1987/88 INDEX

Percent  
of Total Commodity:

Total Food Grains	20.2%
Total Pulses	2.8%
Vegetables, Including Potatoes	7.8%
Major Fruits	3.0%
Total Meat and Fish	11.4%
Total Milk	25.0%
Edible Oils	2.8%
Sweeteners	10.3%
Cotton	11.6%
Total Eggs	1.2%
Timber	1.9%
Firewood	2.0%
FARM AND FOREST PRODUCTION INDEX	100.0%

# Appendix II

MAJOR FARM AND FOREST INPUTS [1]  
1971/72 to 1987/88

	FARM LABOR FORCE	WATER AVAILA- ABILITY	FERTILIZER OFF TAKE	PEST- ICIDES IMPORTS	IMPROVED SEED DIS- TRIBUTION
YEAR	(Million)	(Million Acre Feed	(000 Nutri- ent Tons)	----(000 Tons)----	
1971.72	10.63	71.10	379.20	2438.00	22.54
1972.73	10.86	81.17	436.20	4840.40	18.10
1973.74	10.99	80.06	402.90	6473.60	27.77
1974.75	11.12	88.02	425.50	6927.60	26.31
1975.76	11.44	86.96	550.60	13758.30	43.16
1976.77	11.76	84.57	631.80	16225.70	93.55
1977.78	12.09	89.44	713.60	12754.40	48.42
1978.79	12.43	87.39	879.80	7727.30	48.95
1979.80	12.72	91.14	1044.30	4419.10	60.89
1980.81	13.01	97.79	1079.50	7105.00	73.41
1981.82	13.32	96.45	1080.00	5481.00	79.48
1982.83	13.63	101.40	1243.60	8860.30	70.30
1983.84	13.63	103.69	1202.66	10662.50	75.60
1984.85	13.63	102.81	1253.26	15889.20	86.39
1985.86	14.60	104.73	1511.70	17498.90	75.22
1986.87	14.13	109.72	1783.84	20647.80	77.67
1987.88	14.83	112.22	1720.00	7129.00	84.00
1988.89	15.29	114.66	1792.00	7700.00	92.00
% Change					
1971.72-88.89	2.2%	2.9%	9.6%	7.0%	8.6%
1984.85-88.89	2.9%	2.8%	9.4%	-16.6%	1.6%

[1] government of Pakistan, Finance Division, Economic Advisor's Wing, Economic Survey 1987-88, June, 1988, Islamabad, Pakistan.

[2] government of Pakistan, MINFA, Food and Agriculture Division, (Planning Unit), Agricultural Statistics of Pakistan, 1986, Vol. I, Islamabad, April 1988.

[3] Based on new tractors during the last ten year period.

MAJOR FARM AND FOREST INPUTS [1]  
1971/72 to 1987/88 (Continued)

YEAR	TUBEWELL	TRACTOR	CREDIT	TOTAL	FOREST AREA
	INVEN- TORY [2]	INVEN- TORY [3]	DIS- BURs. ED	CROPPED AREA	
	(Rupees (Million))			(Million Hectares)	
	---(Number)----				
1971.72	108500	36305	128.00	16.60	2.72
1972.73	119285	35752	106.75	16.93	2.81
1973.74	130795	38568	913.30	18.28	2.85
1974.75	154290	42258	1010.07	17.37	2.80
1975.76	160955	49567	1457.79	18.02	2.84
1976.77	167234	61008	1716.50	18.21	2.86
1977.78	172376	70728	2048.28	19.30	2.89
1978.79	178507	81495	2299.51	19.30	2.77
1979.80	188912	95112	3015.79	19.22	2.76
1980.81	199673	107370	4027.94	19.38	2.85
1981.82	207079	122439	5102.14	19.78	2.81
1982.83	213226	142739	6314.96	20.13	2.87
1983.84	230536	164802	8679.56	19.99	2.96
1984.85	248873	185753	9674.00	19.92	3.16
1985.86	253151	199759	13147.45	20.28	3.12
1986.87	258812	206446	15809.00	20.80	3.06
1987.88	263812	218544	15893.00	20.80	3.06
1988.89	269312	227366	14893.00	21.10	3.05
% Change					
1971.72-88.89	5.5%	11.4%	32.3%	1.4%	0.7%
1984.85-88.89	2.0%	5.2%	11.4%	1.4%	-0.9%

INDEX OF INPUTS  
USED FOR FARM  
& FOREST PRODUCTION  
(Price Weighted)

---

YEAR	84/85=100
1971.72	74.4
1972.73	77.5
1973.74	80.5
1974.75	80.4
1975.76	83.3
1976.77	84.8
1977.78	88.8
1978.79	89.9
1979.80	91.6
1980.81	94.2
1981.82	95.8
1982.83	99.0
1983.84	99.5
1984.85	100.0
1985.86	104.9
1986.87	106.8
1987.88	108.2
1988.89	110.7
<b>% Change</b>	
1971.72-88.89	2.4%
1984.85-88.89	2.6%

WEIGHTS FOR FARM INPUTS INDEX  
1984/85

ITEM:	ASSUMPTIONS:	UNIT	WEIGHT
LABOR	[1]	Rps/person	4200
WATER	[2]	Rps/Acre Foot	224
FERTILIZER	[3]	Rps/Nutrient Ton	5565
PESTICIDES	[4]	Rps/Ton	75
SEED	[5]	Rps/ton	2073
TUBEWELLS	[6]	Rps/Well	10000
TRACTORS.	[7]	Depreciation/Tractor	13500
CREDIT	[8]	Average Interest Rate	0.11
FARM LAND	[9]	Opportunity Cost/Hectare	3300
FOREST LAND	[10]	Opportunity Cost/Hectare	181.5

[1] Rs. 35 per day for 120 days.

[2] Based on values shown in Chaudhry, Aslam, Special Report Series No. 15, Privatization of Scarp Tubewells: Some Economic Considerations, Economic Analysis Network Project, USAID and Directorate of Agricultural Policy, government of Pakistan, September 1989, p. 25.

[3] Based on the price of Urea.

[4] Based on the average import price.

[5] Based on the price of wheat plus 10% for seed.

[6] Based on tubewell value of Rps 100,000 and ten year straight line depreciation.

[7] Based on a tractor value of Rs. 135,000 and 10 year straight line depreciation.

[8] Based on interest charged by the Agricultural Development Bank. Shown in Scott, William and Redding, David, Agricultural Credit in Pakistan, USAID, Islamabad, Pakistan, March 1988.

[9] Based on land at Rs. 30,000 per Hectare and 11% interest.

[10] Based on forest land at Rs. 1650/Hectare and 11% interest.

THE FARM INPUTS INDEX:  
1987-88 PROPORTIONAL WEIGHTS

Percent of Total Farm Input:	
Farm Labor Force	35.7%
Water Availability	14.4%
Fertilizer Off Take	5.5%
Pesticide Imports	.3%
Improved Seed Distribution	.2%
Tractor Inventory	1.5%
Credit Disbursed	1.0%
Total Cropped Area	39.4%
Total Forest Area	.3%
INDEX OF FARM INPUTS USED	100.0%

# Appendix III

## AGRICULTURAL BUSINESS PRODUCTION [1] [2] [3]

### FOOD MANUFACTURE:

YEAR	APPARENT WHEAT GROUND INTO FLOUR [4]	APPARENT RICE MILLED [5]	OILSEED CRUSHED	VEGE- TABLE GHEE PROD.	MEAT AND FISH SLAUGHTER AND PRO- CESSING
	----- (000 Metric Tons) -----				
1971.72	6027	1809	1453	162	723
1972.73	7902	1288	1434	187	783
1973.74	6048	1587	1361	225	837
1974.75	5530	1509	1281	272	810
1975.76	7673	1764	1096	277	858
1976.77	8691	1895	987	326	926
1977.78	9143	1835	1168	360	1017
1978.79	8367	1821	1004	422	1076
1979.80	10857	1808	1438	452	1119
1980.81	9813	2936	1428	505	1135
1981.82	9643	3224	1464	531	1212
1982.83	10158	3238	1607	513	1284
1983.84	10604	3140	1007	595	1353
1984.85	10875	3116	1909	640	1458
1985.86	11134	2744	2263	612	1573
1986.87	11289	3277	2430	609	1651
1987.88	12000	3100	2785	697	1737
1988.89	13200	2945	2698	620	1837
%Change					
1971.72-88.89	4.7%	2.9%	3.7%	8.2%	5.6%
1984.85-88.89	5.0%	-1.4%	9.0%	-0.8%	5.9%

- [1] government of Pakistan, Ministry of Finance, Economic Advisor's Wing, Economic Survey, 1987/88, Islamabad, July 1988.
- [2] government of Pakistan, Ministry of Food, Agriculture and Co-operatives, Food and Agriculture Division, Planning Unit Agricultural Statistics of Pakistan, 1986, Islamabad, April 1988.
- [3] government of Pakistan, Federal Bureau of Statistics, Statistics Division, Pakistan Statistical Yearbook, 1989, Karachi, May 1989.
- [4] Net Availability which includes off-take from government stocks plus the amounts from the private sector.
- [5] Local production minus a deduction for seed and wastage at 6%.

AGRICULTURAL BUSINESS PRODUCTION  
1971/72 to 1988/89 (Continued)

FOOD MANUFACTURE:

YEAR	(000 Bottles)			
	MILK DISTRIB- UTION AND PRO- CESSING	SWEET- ENERs. PRO- DUCED	TEA BLENDED	BEVER- AGES PRO- DUCED
1971.72	7800	1715	29	193161
1972.73	7899	1670	30	158004
1973.74	8044	1865	31	180468
1974.75	8193	1824	31	255708
1975.76	8348	2049	30	316332
1976.77	8524	2349	32	346536
1977.78	8704	2565	33	502712
1978.79	8888	2481	38	640272
1979.80	9075	2531	43	576395
1980.81	9267	2756	46	729447
1981.82	9462	2986	51	833330
1982.83	9662	2707	50	730397
1983.84	10242	2664	55	961203
1984.85	10856	2627	47	914134
1985.86	11500	2250	44	1029853
1986.87	12199	2401	49	927076
1987.88	12900	2675	52	1072572
1988.89	13706	2730	55	1112260
<b>%Change</b>				
1971.72-88.89	3.4%	2.8%	3.8%	10.8%
1984.85-88.89	6.0%	1.0%	4.1%	5.0%

AGRICULTURAL BUSINESS PRODUCTION  
1971/72 to 1988/89 (Continued)

TOBACCO MANUFACTURE: CIGARETTE PRODUCTION  
FIBER PROCESSING AND TEXTILE MANUFACTURE: COTTON GINNED, COTTON YARN PRODUCED, WOOLEN FABRIC PRODUCTION, JUTE TEXTILE PRODUCTION

YEAR	CIGARETTE PRODUCTION (Million)	COTTON GINNED (000 M. Tons)	COTTON YARN PRODUCED (Metric Tons)	WOOLEN FABRIC PRODUCTION (000 Sq. Meters)	JUTE TEXTILE PRODUCTION (Metric Tons)
1971.72	21772	2121	335702	2367	30202
1972.73	27623	2106	376122	2229	34530
1973.74	27477	1977	379460	1135	36492
1974.75	26804	1902	351200	1091	45362
1975.76	27454	1542	349653	920	42011
1976.77	28379	1305	282640	844	33859
1977.78	31304	1725	297894	780	33383
1978.79	32536	1419	327789	1691	36976
1979.80	34647	2184	362862	1435	41808
1980.81	35891	2145	374947	1733	50173
1981.82	38132	2244	430154	1633	55996
1982.83	38199	2472	448430	1190	66422
1983.84	40096	1485	431581	1398	84001
1984.85	38921	3024	431731	1670	78209
1985.86	39593	3624	482186	1801	100042
1986.87	39929	3927	586371	1776	113514
1987.88	40697	4404	685031	1676	111500
1988.89	33000	4218	747236	1800	100324
%Change					
1971.72-88.89	2.5%	4.1%	4.8%	-1.6%	7.3%
1984.85-88.89	-4.0%	8.7%	14.7%	1.9%	6.4%

AGRICULTURAL BUSINESS PRODUCTION  
1971/72 to 1988/89 (Continued)

FARM INPUT MANUFACTURE AND CREDIT DISBURSEMENT:

YEAR	CHEMICAL FERTILIZER PRO- DUCTION (000 Nutri- ent tons)	TUBE- WELL PRO- DUCTION -----Number-----	TRACTOR PRO- DUCTION (000 M. Tons)	FEED MIXED (Rupees Million)	CREDIT DIS- BURS.ED
1971.72	221	10344	1600	3827	128.00
1972.73	281	10260	1400	3874	106.75
1973.74	303	8477	2000	4018	913.30
1974.75	326	8863	2800	3775	1010.07
1975.76	327	8847	5766	3899	1457.79
1976.77	321	8767	6885	3837	1716.50
1977.78	325	8820	8238	4042	2048.28
1978.79	364	8642	5260	4128	2299.51
1979.80	439	8783	11719	4665	3015.79
1980.81	640	6160	10464	4769	4027.94
1981.82	753	6200	13381	4839	5102.14
1982.83	1072	4383	13894	5163	6314.96
1983.84	1107	4240	13456	4435	8679.56
1984.85	1119	4464	13949	5354	9674.00
1985.86	1128	4278	11331	5788	13147.45
1986.87	1284	5661	13043	5996	15809.00
1987.88	1288	5000	11014	6255	15893.00
1988.89	1296	5500	12000	6405	14893.00
<b>%Change</b>					
1971.72-88.89	11.0%	-3.6%	12.6%	3.1%	32.3%
1984.85-88.89	3.7%	5.4%	-3.7%	4.6%	11.4%

AGRICULTURAL BUSINESS PRODUCTION  
1971/72 to 1988/89 (Continued)

FORESTRY PRODUCTS:

YEAR	PAPER & FIRE- BOARD      TIMBER      WOOD PRO-      PRO-      PRO- DUCTION      DDUCTION      DDUCTION		
	(Metric Tons)	(Million Cu. Feet)	
1971.72	59352	11.8	19.2
1972.73	65116	8.8	17.0
1973.74	60892	11.3	16.7
1974.75	50155	6.2	11.6
1975.76	42271	6.0	11.4
1976.77	44362	8.4	19.4
1977.78	44679	4.6	16.2
1978.79	85187	8.1	20.4
1979.80	85184	8.2	15.3
1980.81	99591	6.4	15.8
1981.82	104719	5.1	17.1
1982.83	106327	7.4	16.8
1983.84	105465	6.0	12.3
1984.85	119156	11.3	16.1
1985.86	106079	11.1	13.6
1986.87	98026	14.4	19.2
1987.88	101695	15.0	16.0
1988.89	103700	15.5	16.5
<b>%Change</b>			
1971.72-88.89	3.3%	1.6%	-0.9%
1984.85-88.89	-3.4%	8.2%	0.6%

AGRICULTURAL BUSINESS PRODUCTION  
1971/72 to 1988/89 (Continued)

YEAR	AGRICULTURAL BUSINESS PRODUCTION	FARM AND FOREST PRODUCTION	AGRICULTURAL BUSINESS PRODUCTIVITY
	Gross Price Margin Weighted	Price Weighted	
	----- (1984/85=100) -----		
1971.72	57.4	64.2	89.5%
1972.73	58.5	65.8	88.9%
1973.74	61.1	67.9	90.0%
1974.75	58.8	67.2	87.4%
1975.76	60.8	69.9	87.0%
1976.77	63.9	73.2	87.4%
1977.78	67.9	75.7	89.6%
1978.79	70.4	78.7	89.4%
1979.80	76.6	82.2	93.2%
1980.81	83.0	85.0	97.6%
1981.82	89.0	89.2	99.8%
1982.83	92.6	93.1	99.5%
1983.84	91.3	91.4	99.9%
1984.85	100.0	100.0	100.0%
1985.86	101.9	106.0	96.2%
1986.87	111.1	109.4	101.5%
1987.88	118.6	114.4	103.7%
1988.89	118.9	114.4	104.0%
<b>%Change</b>			
1971.72-88.89	4.4%	3.5%	0.9%
1984.85-88.89	4.4%	3.4%	1.0%

GROSS MARGIN WEIGHTS OF THE AGRICULTURE  
BUSINESS PRODUCTION INDEX  
(1984/85)

ITEM:	GROSS MARGIN
<b>APPARENT WHEAT GROUND INTO FLOUR</b> (Metric Ton):	184
Wheat flour (FAQ, Open Market), Lahore @ Rps 90.73/40 Kg.	
Wheat, FAQ, Lahore @ Rps 83.37/40 Kg. , Gross Margin =Rps 7.36	
<b>APPARENT RICE MILLED</b> (Metric Ton):	700
Head rice yield of .57 @ 112.5 Rps/40Kg	
Broken rice yield of .13 @ 80Rps/40Kg	
Bran yield of .07 @ 45Rps/40Kg	
Husk yield of .21 @ 5Rps/40 Kg	
Wastage of .02	
Paddy rice, IRR1-6 @ 51Rps/40Kg	
<b>OILSEED CRUSHED</b> (Metric Ton)	646
Cotton Seed Oil, Hyderabad, yield of .1145 @ Rps342.91/40Kg	
Cottonseed Oilcake, Hyderabad, yield of .84 @ Rps74.83/40Kg	
Cottonseed @ Rps 76.28/40Kg	
<b>VEGETABLE GHEE</b> (Metric Ton)	3435
Retail Vegetable Ghee @ Rps.13.74/Kg. & a 25% margin	
<b>MEAT &amp; FISH SLAUGHTER AND PROCESSING</b> (Metric Ton)	2468
Mutton @ Rps 907.30/40Kg and a margin of 10%	
<b>MILK DISTRIBUTION AND PROCESSING</b> (Metric Ton)	470
Milk at Rps 187.98/40Kg and a 10% margin	
<b>SWEETENERS. PRODUCED</b> (Metric Ton)	4685
Sugar @ Rps310/40Kg - Sugar cane @ Rps 9.81/a .08 Recovery	
<b>TEA BLENDED</b> (Metric Ton)	4188
Lipton tea, gold medal, Karachi @Rps1675.2/40Kg and a 10% margin	
<b>BEVERAGES PRODUCED</b> (Per Thousand Bottles)	1870
Coca Cola, Karachi @ Rps/crate of 24 and a 90% gross margin	
<b>CIGARETTE PRODUCTION</b> (Million):	75000
Cigarettes, K-2 Plain, Rps 187.7*1000 and a 45% gross margin	
<b>COTTON GINNED</b> (Metric Ton)	1646.5
Cotton NT Sind, N. G. Karachi @ Rps 574.07 and a yield of .343	
Cotton Seed, Karachi @ Rps 88.20 and a yield of .657	
Seed Cotton, B-557, Procurement @ Rps 189/40Kg	
<b>COTTON YARN PRODUCED</b> (Metric Ton)	7658
Cot.Yarn 20/1, Kar. @ Rps 127.66/5Kg and a gross margin of 30%	

GROSS MARGIN WEIGHTS OF THE AGRICULTURE (CONTINUED)  
BUSINESS PRODUCTION INDEX  
(1984/85)

ITEM:	GROSS MARGIN
WOOLEN FABRIC PRODUCTION (000 Sq. Meters) Worsted Laurencepur, Karachi @Rps100/Sq/M. & 50%	50000
JUTE TEXTILE PRODUCTION (Metric Ton) Jute Bags, Local, Faisalabad @ 12.7 per bag. 6 bags = 1 kg. Gross margin of 40%.	30480
CHEMICAL FERTILIZER PRODUCTION (Metric Ton) Urea/Metric ton = Rps 5565	5565
TUBEWELL PRODUCTION (Per Tubewell) Tubewell @ Rps 100000 and a gross margin of 20% for assembly	20000
TRACTOR PRODUCTION (Per Tractor) Tractor MF-24,47 H.P., Lahore @ Rps88000 and a gross margin of 20% for assembly.	17600
MIXED FEED PRODUCTION (Metric Ton) Maize, FAQ, Faisalabad @Rps91.60/40Kg and a 10% gross margin	229
CREDIT DISBURSED (Million Rupees) ADB average of 6% markup	60000
PAPER AND PAPER BOARD (Metric Ton) Duplication paper-White, Peshawar @ Rps10636/Ton & a gross margin of 90%	9572
TIMBER PRODUCTION (Thousand Cubic Feet) Timber Shesham, Karachi, @ 3266.64/Cubic Meter & a 50% margin.	181480
FIREWOOD PRODUCTION (Thousand Cubic Meters) Firewood, Mixed dry, Peshawar, @Rps 33.41/40Kg Each cubic meter is=12 of the 40Kg units. Assumed margin is 10%	40092

AGRICULTURAL BUSINESS PRODUCTION INDEX:  
(1987/88 PROPORTIONAL WEIGHTS)

Production Item:	Percent of Total
Food Manufacture:	
Apparent Wheat Ground into Flour	3.3%
Apparent Rice Milled	3.2%
Oilseed Crushed	2.7%
Vegetable Ghee Produced	3.6%
Meat & Fish Slaughter and Processing	6.4%
Milk Distribution and Processing	9.1%
Sweeteners Produced	18.7%
Tea Blended	.3%
Beverages Produced	3.0%
Tobacco Manufacture:	
Cigarettes Produced	4.6%
Fiber Processing and Textile Manufacture:	
Cotton Ginned	10.8%
Cotton Yarn Produced	7.8%
Woolen Fabric Produced	.1%
Jute Textile Production	5.1%
Farm Input Manufacture:	
Chemical Fertilizer Production	10.7%
Tubewell Production	.2%
Tractor Production	.3%
Feed Mixed	2.1%
Credit Disbursed	1.4%
Forestry Products:	
Paper & Paper Board Production	1.5%
Timber Production	4.1%
Firewood Production	1.0%
AGRICULTURAL BUSINESS	100.0%

# Appendix IV

## MIXED FEED PRODUCTION

YEAR	FEED GRAINS	MAJOR OILSEED CAKES	FEED GRAINS AND CAKES
(000 M.T.)			
1971.72	2562	1265	3827
1972.73	2623	1252	3874
1973.74	2827	1191	4018
1974.75	2645	1129	3775
1975.76	2934	965	3899
1976.77	2966	871	3837
1977.78	3012	1030	4042
1978.79	3241	886	4128
1979.80	3395	1270	4665
1980.81	3507	1262	4769
1981.82	3544	1295	4839
1982.83	3740	1423	5163
1983.84	3542	892	4435
1984.85	3663	1691	5354
1985.86	3782	2006	5788
1986.87	3822	2153	5996
1987.88	3768	2467	6255
1988.89	3993	2390	6406

## ANNUAL % CHANGE

1971.2-88.89	2.6%	3.8%	3.1%
1984.5-88.89	2.2%	9.0%	4.6%

MIXED FEED PRODUCTION  
MIXED FEED PRODUCTION FROM GRAINS

RICE							
YEAR	GRAIN		BROKEN		NON-FOOD	FEED	BROKEN
	POLISH [1]	ENDS [2]	WHEAT [3]	MAIZE [4]	BAJRA [5]	JOWAR [6]	BARLEY [7]
(000) TON							
1971.72	248.8	384.5	826.8	705.1	107.9	280.9	8.2
1972.73	256.3	396.0	893.1	705.9	91.2	271.4	8.7
1973.74	270.1	417.4	915.5	767.1	105.4	340.3	11.2
1974.75	254.5	393.3	920.8	746.9	79.6	239.0	11.0
1975.76	287.9	445.0	1042.9	802.5	92.4	252.9	10.4
1976.77	301.1	465.4	1097.3	763.8	93.2	235.2	9.9
1977.78	324.5	501.4	1004.1	820.9	95.5	255.7	9.6
1978.79	359.9	556.2	1194.0	798.6	95.2	227.2	10.3
1979.80	353.7	546.7	1302.8	875.2	83.2	224.2	9.4
1980.81	343.6	530.9	1377.0	970.4	64.2	206.8	14.0
1981.82	377.3	583.0	1356.5	930.3	81.7	202.1	12.6
1982.83	378.9	585.6	1489.7	1005.4	66.0	199.7	14.8
1983.84	367.3	567.7	1305.8	1013.5	76.9	199.9	11.2
1984.85	364.7	563.6	1404.4	1027.6	85.1	207.4	10.5
1985.86	321.1	496.2	1670.8	1009.4	77.5	196.7	10.7
1986.87	383.5	592.7	1441.9	1111.2	69.8	212.0	10.7
1987.88	356.5	551.0	1521.0	1127.0	40.5	162.9	9.0
1988.89	336.6	520.2	1728.4	1120.0	63.6	213.3	10.7

ANNUAL % CHANGE

1971.2-88.89	1.8%	1.8%	4.4%	2.8%	-3.1%	-1.6%	1.6%
1984.5-88.89	-2.0%	-2.0%	5.3%	2.2%	-7.0%	0.7%	0.5%

[1] Rice polish estimated as 11% of paddy rice.

[2] Rice grain ends estimated as 17% of paddy rice.

[3] Cracked and broken wheat estimated as 12% of wheat.

[4] All maize is considered as a feed grain.

[5] Feed Bajra is estimated as 30% of the total.

[6] Feed Jowar is estimated as 90% of all Jowar.

[7] Poor quality barley is estimated as 8% of the total.

MIXED FEED PRODUCTION  
PRODUCTION OF MAJOR CEREAL GRAINS:

YEAR	RICE	WHEAT	MAIZE	BAJRA	JOWAR	BARLEY	TOTAL
	(000) TONS						
1971.72	2261.9	6890.4	705.1	359.6	312.1	102.9	10632.0
1972.73	2329.7	7442.3	705.9	304.1	301.5	108.9	11192.4
1973.74	2455.1	7628.9	767.1	351.2	378.1	139.5	11719.9
1974.75	2313.8	7673.5	746.9	265.5	265.6	137.1	11402.4
1975.76	2617.5	8690.7	802.5	307.9	281.0	130.1	12829.7
1976.77	2737.5	9143.9	763.8	310.8	261.3	123.6	13340.9
1977.78	2949.6	8367.2	820.9	318.3	284.1	120.6	12860.7
1978.79	3272.0	9950.0	798.6	317.4	252.4	129.3	14719.7
1979.80	3215.8	10856.4	875.2	277.3	249.1	118.0	15591.8
1980.81	3123.2	11474.6	970.4	214.0	229.8	175.5	16187.5
1981.82	3429.7	11304.2	930.3	272.4	224.6	157.5	16318.7
1982.83	3444.7	12414.4	1005.4	219.9	221.9	185.3	17491.6
1983.84	3339.5	10881.9	1013.5	256.2	222.1	139.5	15852.7
1984.85	3315.2	11703.0	1027.6	283.7	230.4	131.6	16691.5
1985.86	2918.9	13923.0	1009.4	258.4	218.6	133.7	18462.0
1986.87	3486.3	12015.9	1111.2	232.7	235.5	134.2	17215.8
1987.88	3241.0	12675.0	1127.0	135.0	181.0	112.0	17471.0
1988.89	3060.0	14403.0	1120.0	212.0	237.0	134.0	19166.0

## ANNUAL % CHANGE

1971.2-88.89	1.8%	4.4%	2.8%	-3.1%	-1.6%	1.6%	3.5%
1984.5-88.89	-2.0%	5.3%	2.2%	-7.0%	0.7%	0.5%	3.5%

MIXED FEED PRODUCTION  
COTTONSEED PRODUCTION AND USE:  
PRODUCTION UTILIZATION

YEAR	LINT	SEED		WASTE	CRUSH
		(000 Metric Tons)			
1971.72	707	1354	37	141	1176
1972.73	702	1344	34	140	1170
1973.74	659	1262	38	132	1092
1974.75	634	1214	34	127	1053
1975.76	514	984	35	99	850
1976.77	435	833	34	84	715
1977.78	575	1101	35	115	951
1978.79	473	906	38	92	776
1979.80	728	1394	37	146	1211
1980.81	715	1369	37	137	1195
1981.82	748	1432	39	149	1244
1982.83	824	1578	39	158	1381
1983.84	495	948	39	102	807
1984.85	1008	1930	39	199	1692
1985.86	1208	2313	41	239	2033
1986.87	1327	2541	44	263	2234
1987.88	1468	2936	45	294	2597
1988.89	1406	2812	45	281	2486
ANNUAL % CHANGE					
1971.2-88.89	4.1%	4.4%	1.2%	4.1%	4.5%
1984.5-88.89	8.7%	9.9%	3.6%	9.0%	10.1%

MIXED FEED PRODUCTION  
COTTONSEED PRODUCTION AND USE:

YEAR	OIL (000 Metric Tons)	CAKE	EXTRACTION RATE (%)
1971.72	158	1018	13.45%
1972.73	154	1016	13.15%
1973.74	140	952	12.85%
1974.75	127	926	12.06%
1975.76	104	746	12.25%
1976.77	87	628	12.15%
1977.78	115	837	12.05%
1978.79	93	683	11.95%
1979.80	144	1068	11.85%
1980.81	140	1055	11.75%
1981.82	145	1099	11.65%
1982.83	160	1221	11.55%
1983.84	92	715	11.45%
1984.85	194	1499	11.45%
1985.86	233	1801	11.45%
1986.87	256	1978	11.45%
1987.88	297	2300	11.45%
1988.89	285	2201	11.45%

ANNUAL % CHANGE

1971.2-88.89	3.5%	4.6%
1984.5-88.89	10.1%	10.1%

MIXED FEED PRODUCTION  
MUSTARD AND RAPESEED PRODUCTION:

YEAR	PRODUCTION	ESTIMATED	
		CRUSH	CAKE
	_(000 Metric Tons)_		
1971.72	301	277	247
1972.73	287	264	235
1973.74	292	269	239
1974.75	248	228	203
1975.76	267	246	219
1976.77	296	272	243
1977.78	236	217	194
1978.79	248	228	203
1979.80	247	227	203
1980.81	253	233	207
1981.82	239	220	196
1982.83	246	226	202
1983.84	217	200	178
1984.85	235	216	193
1985.86	250	230	205
1986.87	213	196	175
1987.88	204	188	167
1988.89	230	212	189
ANNUAL % CHANGE			
1971.2-88.89	-1.6%	-1.6%	-1.6%
1984.5-88.89	-0.5%	-0.5%	-0.5%

## MIXED FEED PRODUCTION

YEAR	CAKE	MAJOR
	FROM	OILSEED
	MAJOR	CRUSH
	OILSEEDS	

(000 Metric Tons)

1971.72	1265	1453
1972.73	1252	1434
1973.74	1191	1361
1974.75	1129	1281
1975.76	965	1096
1976.77	871	987
1977.78	1030	1168
1978.79	886	1004
1979.80	1270	1438
1980.81	1262	1428
1981.82	1295	1464
1982.83	1423	1607
1983.84	892	1007
1984.85	1691	1909
1985.86	2006	2263
1986.87	2174	2430
1987.88	2487	2785
1988.89	2413	2698

## ANNUAL % CHANGE

1971.2-88.9	3.9%	3.7%
1984.5-88.8	9.3%	9.0%

## EAN PROJECT PUBLICATIONS

### Published Books

May 90 Akhtar Mahmood and Forrest Walters, Pakistan Agriculture, A Description of the Agricultural Economy

### Special Reports Series

- Jan 87 No. 1 Forrest Walters, et. al., The Pakistan Poultry Industry: A Policy Analysis Framework  
(Out of Print)
- Dec 87 No. 2 Carrol Rock and Kerry Gee, An Appraisal of Agricultural Price Statistics in Pakistan
- Feb 88 No. 3 John McKean, A Guide to Interindustry Analysis of the Pakistan Economy
- May 88 No. 4 Melvin D. Skold and Kenneth C. Nobe, Agricultural Policy Research and Analysis: Implications for the Pakistan Economic Analysis Network Project
- May 88 No. 5 Donald W. Lybecker and Melvin D. Skold, Economic Analysis of the Agricultural Production Sector for Policy Formulation (Out of Print)
- May 88 No. 6 Pakistan Poultry Databook
- May 88 No. 7 M. Aslam Chaudhry and Paul W. Heisey, Production and Marketing of Wheat Seed in Punjab
- Oct 88 No. 8 Kamil Lodhi, The Pakistan Sugar Industry: An Economic and Policy Analysis
- Nov 88 No. 9 M. Aslam Chaudhry, Rationalization of Irrigation Water Charges in Pakistan: Answers to Some Policy Questions
- Dec 88 No. 10 M. Aslam Chaudhry and Mubarik Ali, Economics of Past and Prospective O&M Investments in the Canal Irrigation System in Pakistan's Punjab
- Dec 88 No. 11 Mubarik Ali, Supply Response of Major Crops in Pakistan: A Simultaneous Equation Approach
- July 89 No. 12 Mubarik Ali, Forrest Walters, and Rao Shafiq-ur-Rehman, Contributions and Interlinkages of the Food and Fiber System in Pakistan's Economy
- July 89 No. 13 Abdul Qayyum Khan, Development of Updating Procedures for and Analysis of Pakistan Interindustry Relationships
- July 89 No. 14 Muhammad S. Anjum, Kamil Lodhi, and Agha Abbas Raza, Pakistan's Dairy Industry: Issues and Policy Alternatives
- Sep 89 No. 15 M. Aslam Chaudhry, Robert A. Young, Privatization of SCARP Tubewells: Some Economic Considerations
- April 90 No.16 Kamil Lodhi, Shahab Qureshi, Khawaja Shabbir Ahmad, Rifatullah Burki, Food Marketing Margins: Price Spreads for a Representative Consumer Basket in Pakistan
- May 90 No.17 William E. Scott, K.A. Siddiqi, William Spencer, Albert Madsen, Muhammad Ijaz Ahmad, Export Restrictions: A Study of Restrictions on Agricultural Exports in Pakistan

### Policy Options Briefing Paper Series

- Jun 89 No. 1 Kamil Lodhi, The Pakistan Sugar Industry
- Jun 89 No. 2 M. Aslam Chaudhry, Benefits of O&M Expenditure in the Canal System in Punjab

### Work Shop Manual Series

- May 90 No. 1 Marketing of Agricultural Products
- May 90 No. 2 Agricultural Policy Manual: A Discussion of Agricultural Policies For Development

### Reference Publications

- 87/88/89 EAN Membership Directory
- 88/89 Nilofer Hashmi, Style Manual of Technical Writing (1st & 2nd editions)
- May 90 Ch. Mohammad Ijaz, Chartbook