PAKISTAN'S DAIRY INDUSTRY: ISSUES AND POLICY ALTERNATIVES

Special Report Series
No. 14

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

Islamabad
July 1989

ACKNOWLEDGEMENTS

The Pakistan Dairy Industry Study Team wishes to express gratitude and sincere thanks to the many individuals who provided valuable background information and data for the study. Among these, special thanks are due to the members of Pakistan Dairy Association, technical and managerial staff of UHT Milk Processing Plants, officials of Livestock Division and Agricultural Development Bank of Pakistan, representatives of cattle colonies and dairy cooperatives, dairy technologists and farmers. Without their expert insights into the critical issues faced by the dairy industry, this study could not have been completed.

The study team is also grateful to Mrs. Nilofer Hashmi for editorial improvements and Mr. M. Riaz Lodhi, Data Processing Specialist, for providing assistance in the use of software packages and preparing the final manuscript for camera-ready printing.

PAKISTAN'S DAIRY INDUSTRY: ISSUES AND POLICY ALTERNATIVES

EXECUTIVE SUMMARY

Introduction

The Pakistan dairy industry has achieved a fairly advanced level of development, with high levels of per capita production and a broad array of processed milk products. Average annual per capita milk production in 1988, as estimated by the Livestock Division of the Ministry of Food, Agriculture and Cooperatives, has reached 124 kgs. 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 consumption is greater than that of a number of developed countries and is unmatched by any large country of South Asia.

Production

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 roughages 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 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.

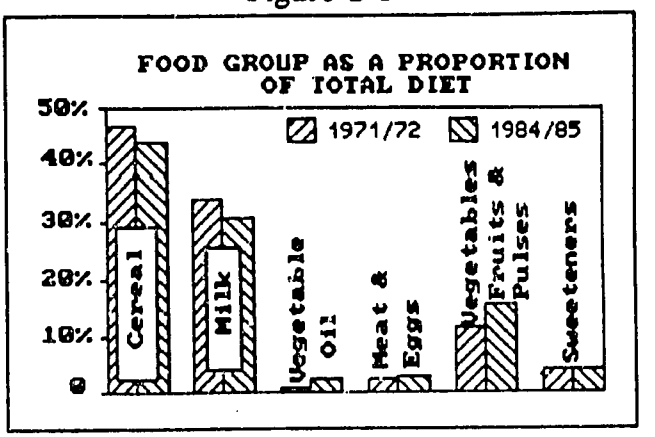
Consumption

Milk is a major part of food consumption and plays a prominent role in the Pakistani diet. As a food group, all milk (both milk and milk equivalents) is second only to cereals in level of per capita consumption. By weight, all milk makes up nearly one third of all food consumed. It is consumed as fresh, boiled, powdered and processed milk, and as yogurt, ghee, lassi, butter, cheese, ice cream, sweetmeats, and other confectioneries. About half of the all milk is consumed as fresh or boiled milk, about one fourth as ghee, and one sixth as yogurt or curd. The average consumer, according to the most recent Household Income and Expenditure Survey by the Federal Bureau of Statistics, spends one fourth of his food budget on all milk.

As incomes improve, the average Pakistani has begun to diversify his diet, consuming a larger proportion of vegetable oil, fruits & vegetables, pulses, meat and eggs. The apparent diversification has led to lower levels of all milk and cereal consumption. However, the consumption of fresh and boiled milk per capita has trended upward. A summary comparison of food consumption by food groups is shown in the Figure S-1.

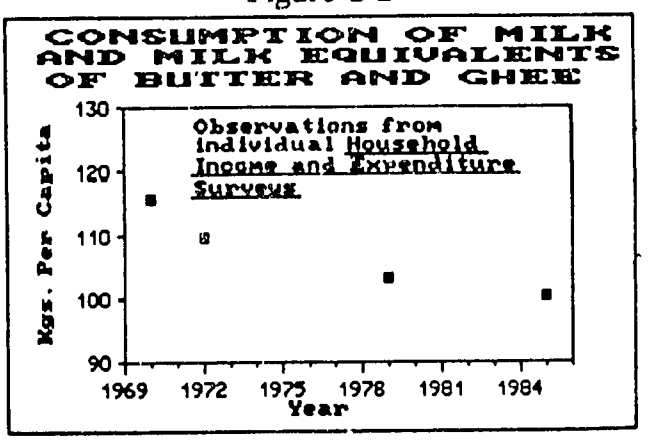
Consumption of both cereals and all milk has declined while the consumption of most other food groups has increased. The decline in cereals is due largely to reduced wheat consumption. Rice consumption has remained relatively steady. The decline in the consumption of all milk was due, almost entirely, to reduced consumption of ghee made from milk. The per capita consumption of ghee made from milk dropped from an estimated 2.5 kgs. per year in 1971/72 to 1.2 kgs. in 1984/85.

Figure S-1



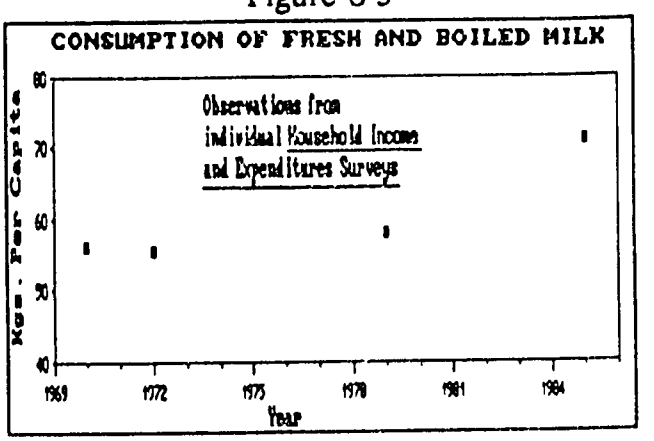
The large drop in consumption of ghee made from milk released milk for fresh and boiled milk use. At the same time, ghee made from milk was replaced with vegetable ghee. The per capita consumption of vegetable ghee has almost tripled from 2.4 kgs. per year in 1971/72 to 6.9 kgs per year in 1984/85. The downward drift in the consumption of all milk or milk and milk equivalents is shown in Figure S-2. While the consumption of all milk has been trending downward, the consumption of fresh and boiled milk per capita has been rising as shown in Figure S-3.

Figure S-2



Apparently, more fresh milk is available because less milk is being drawn off for ghee making. Each Kilogram of ghee produced requires roughly 18-24 kilograms of fresh milk.

Figure S-3



Prices

The retail prices of milk, beef, and ghee have been trending upward over the last 15 years. Retail beef prices have been rising rapidly at about 12% per year, apparently, due to the effects of income and the preference for meat. The retail price trends of fresh milk and ghee have been somewhat less positive at around 10% per year since 1973. Also, more recently, since 1985, the retail price of ghee made from milk has become nearly static (Figure S-5).

The positive trends of nominal retail prices of milk and ghee have been largely offset by inflation. Deflated wholesale prices of milk and ghee have generally trended downward. The trend decline in deflated retail prices of milk and ghee probably indicates reduced demand, as well as some expansion in production.

Also, as discussed earlier, ghee made from milk is probably being replaced by vegetable ghee.

Both nominal and deflated retail prices of beef have been increasing, reflecting a strong demand for meat and relatively constant per capita production. Beef prices are generally lower than other meats and are more acceptable to a larger array of consumers. Beef prices play a role in dairying because the slaughter value of the spent milk animal is a major source of farm income (Figure S-6).

Marketing

Marketing channels for milk are largely determined by the location and nature of the producer. For this study producers are classed as peri-urban and commercial, rural market oriented, and rural subsistence. Peri-urban and commercial producers are usually located near urban areas and sell through relatively direct channels to the consumer. The rural subsistence producer usually consumes most milk produced within the household. The small amount that is marketed is sold to other rural families or converted to ghee. The rural market oriented producer is located in rural areas and sells through several layers of collection groups. The marketing channels for milk are shown in Figure S-7.

Peri-urban and commercial producers deliver and sell fresh milk to urban milk

Figure S-4

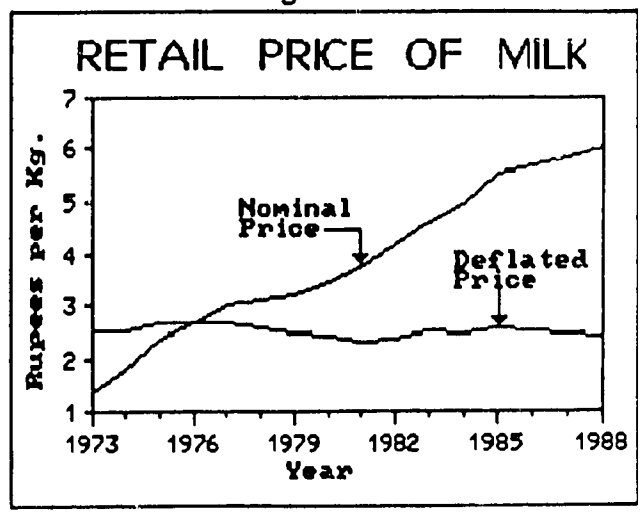


Figure S-5

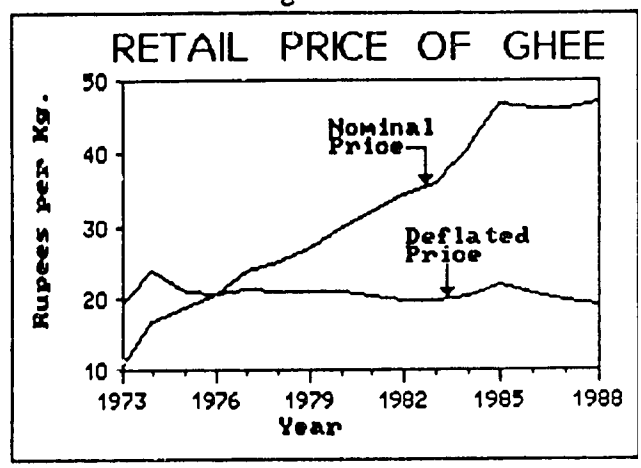
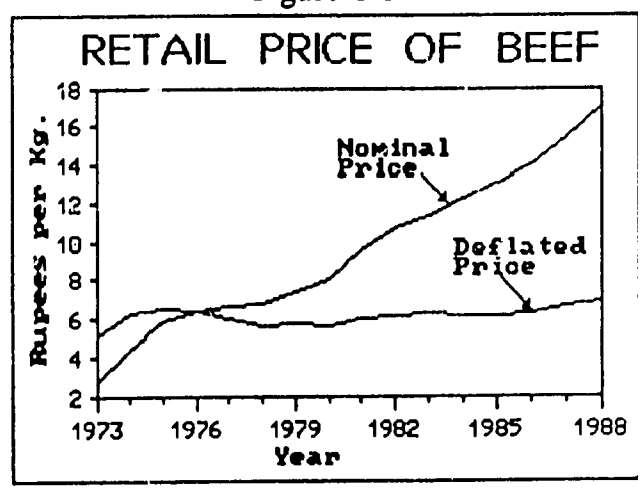
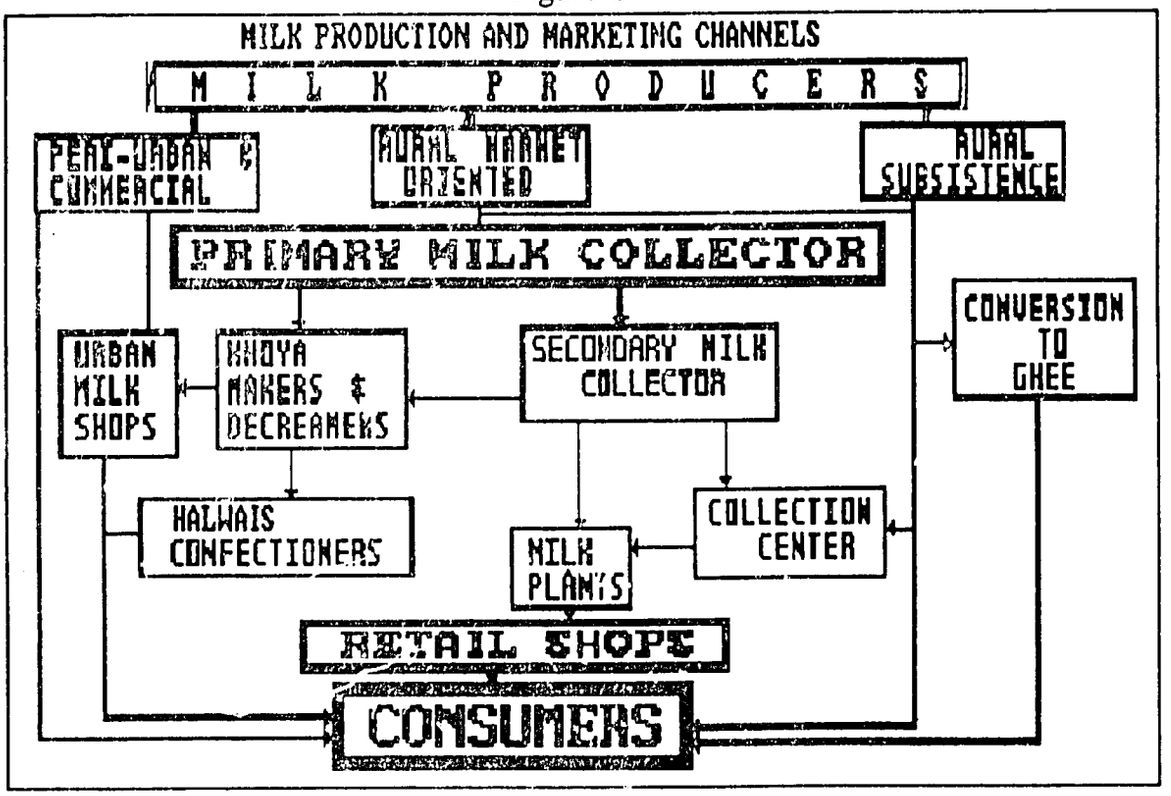


Figure S-6



shops. A few peri-urban and commercial producers deliver milk to the urban consumer. In addition some milk from peri-urban and commercial producers is drawn off by halwais for making sweet meats. This channel appears to be relatively efficient, however, the price signal from the consumer to the producer is buffered by summer icing of milk that dilutes milk so that the consumer pays the same price for milk but receives less actual milk. Icing is a common practice to cool and preserve milk during the summer.

Figure S-7



Rural producers who produce a marketable milk surplus have the most complicated market channel. Because rural producers are scattered, a primary or first stage milk collector (katcha dodhi) collects quantities that reach 80 to 100 kgs on bicycle routes of around 6 to 10 kilometers. In the market specialist's terminology this is often called "gathering." The "gatherer" or katcha dodhi sells to a second stage milk collector called pacca dodhi. The pacca dodhi usually has a larger and longer hauling capacity, for example, a horse driven cart or small pick-up truck. The pacca dodhi sells to other larger collection centers, milk plants or de-creamers. If the pacca dodhi sells to a de-creamer or hires his services the milk is separated into cream and skim milk. The skim milk is mixed with other whole milk and sold to urban milk shops. Buffalo milk often has 6-8% butterfat. When the pacca dodhi sells to a milk plant, the milk is made into yogurt, ice cream, or UHT treated milk. In some cases, milk is made into cheese, powdered milk, or pasteurized milk. As noted earlier this multi-layered system appears to buffer the producer from the price and purchase signals given by the consumer. The producer appears not to receive a premium for summer milk or for milk with an unusually high butterfat content except for that paid by milk collection

centers that are operated by processors. Also, the producer is not known to receive a premium or penalty for solids not fat (SNF) contents.

It may be emphasized that there is an urgent need in the marketing system to establish chilling centers in rural areas not only to collect milk from a larger area but also to reduce the need for using ice in the milk being distributed. There is also a need to pay the producer on the basis of butterfat content and SNF content to encourage production of the most desirable milk for processing.

Milk Processing

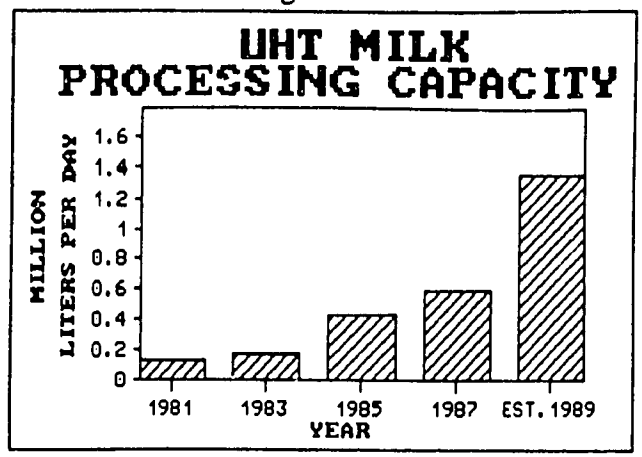
Milk processing is an important part of the food manufacturing industry in Pakistan. A number of cottage industries produce yogurt, lassi, sweetmeats, and desi ghee. More commercialized manufacturers make refrigerated yogurt, ice cream, butter and cheese. Commercial manufacturing also includes pasteurized milk and ultra high temperature (UHT) treated milk. In total, manufacturing and processing of milk probably makes up about 15% of the value added by food manufacturing and perhaps 3% of the value added by all manufacturing.

The introduction of modern milk processing in the dairy sector started between the early 1960s and the mid 1970s when 23 milk pasteurization and sterilization plants were built, largely, by private investors. Plants were located around Karachi, Lahore and Islamabad with the intention of providing pasteurized milk to the rapidly growing urban sector. Besides fresh milk, the new plants recombined skim milk powder and butter oil, made available through the World Food Program. These "first generation" dairy plants eventually all closed down except for one at Lahore. In retrospect, their failure appears to be related to the weak acceptance of the "recombined milk" and the short shelf life of pasteurized milk. There were also a number of operating problems including the lack of trained technologists, inadequate supplies of fresh milk, and poor management of operations.

The "second generation" dairy plants started with experimental production of ultra high temperature (UHT) treated milk by Packages Limited in 1977. The UHT treatment involves heating milk at 130-150 degrees centigrade for 2-3 seconds. This process, also called "flash pasteurization" produces a high bactericidal effect and, when packed aseptically, has a shelf life of several months without refrigeration. After the experiment a new company, Milkpak, was set up which established a plant at Sheikhupura with financing mainly from the International Finance Corporation and the Agricultural Development Bank of Pakistan. The new plant was able to sell UHT treated milk at a profit. At about the same time Tetra Pak Pakistan Limited was organized as a joint venture to produce aseptic packaging material in Pakistan. Currently, Tetra Pak Pakistan Limited is the only domestic plant producing packaging material for UHT milk. This monopoly position and its implications for cost and quality of material is of concern to the UHT manufacturing industry.

Largely due to the successful introduction of UHT treated milk, tax incentives provided in the form of duty exemptions on the import of dairy plant machinery and the availability of domestic and foreign currency financing, there was renewed interest in milk processing in

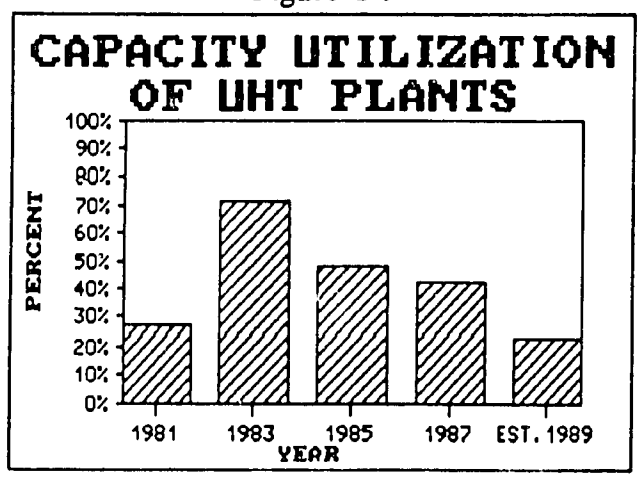
Figure S-8



the mid-1980s. Between 1983-87, 5 new UHT milk plants were set up and UHT capacity was added to an existing pasteurization plant. By the end of 1987, another 15 UHT plants had been sanctioned and were at various stages of implementation. Current and projected UHT processing capacity is shown in Figure S-8. It has grown from roughly 175,000 liters per day in 1981 to over 500,000 liters per day in 1987 representing an annual average growth rate of over 20 per cent. The capacity planned and underway by the end of 1989 will more than double the 1987 level. On the other hand, the market for UHT treated milk grew rapidly up to 1984, after which volume sales of UHT treated milk have dropped to a growth rate of 5% to 10% per year.

As shown in Figure S-9, the rapid growth in capacity and the most optimistic growth in volume sales leads to very low levels of capacity utilization of UHT plants. Overcapacity is, thus, the basic and most fundamental problem facing the UHT milk processing industry. There is simply more production capacity installed or underway than is warranted by the most optimistic projections of growth in the demand for UHT treated milk. The end result of the large growth in capacity is that most plants are operating at such low levels of capacity that they are unable to meet their variable costs. The situation is expected to deteriorate further as additional capacity, currently under construction, comes on line.

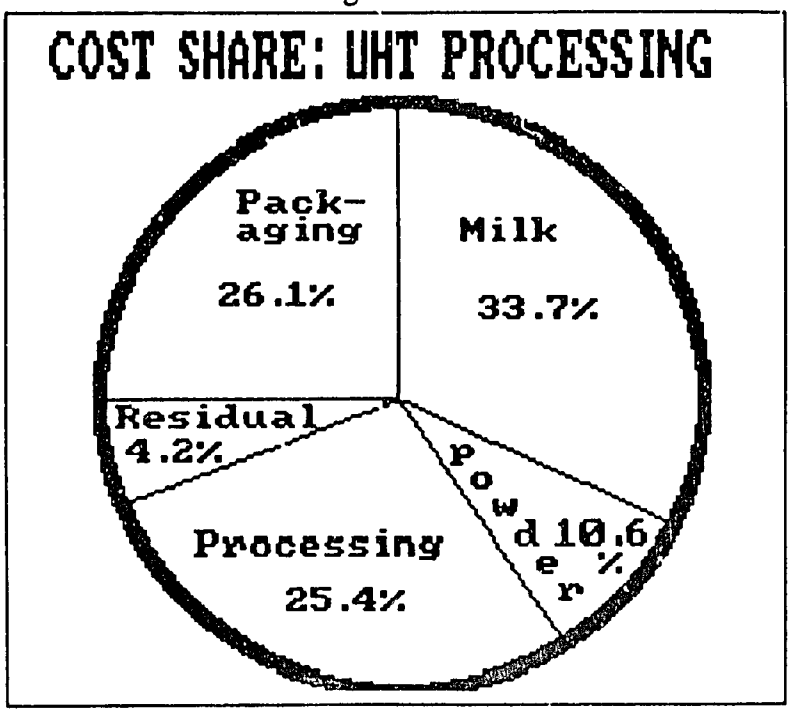
Figure S-9



Clearly there is a need on the part of investors and financing institutions to stop building UHT capacity until the market grows into the current capacity. In future, before building, both investors and financing institutions need to assess the market and the aggregate capacity in the new industry. For the plants caught in the trap of over capacity there is an urgent need to develop product diversification and promotion. For the plants that must close, it would be useful to the industry if the owners could write down the capital in the UHT plant and sell it off to other operators rather than closing and dismantling the plant.

As shown in Figure S-10, most of the costs of the UHT treatment are variable costs consisting of packaging, raw milk, powder and processing costs. Almost three fourths of the costs of producing UHT milk are material costs as raw milk, packaging and milk powder.

Figure S-10



With variable costs making up such a large proportion of total costs, there is little room for selling UHT milk below total costs in the short run while the market is expanding. The alternatives are to close the plant or effectively expand the market through promotion or location of untapped markets.

In the UHT manufacture process, before the raw milk is heated to 130-150 degrees centigrade it is de-creamed or diluted with water. Processed milk, by regulation is standardized at 3.5% butterfat and 8.9% solids not fat. Fresh milk when purchased usually contains more than 3.5% butterfat and less than 8.9% SNF. As a result, UHT manufacturers can decream, add water or both and mix in skimmed milk powder to lower the butterfat content and raise the SNF level. To make this process more cost effective the UHT manufacturers could price raw milk on the basis of both butterfat and SNF contents. Currently, milk is purchased on the basis of butterfat content only. The pure food regulations could be changed to allow a SNF level consistent with the SNF content of raw milk.

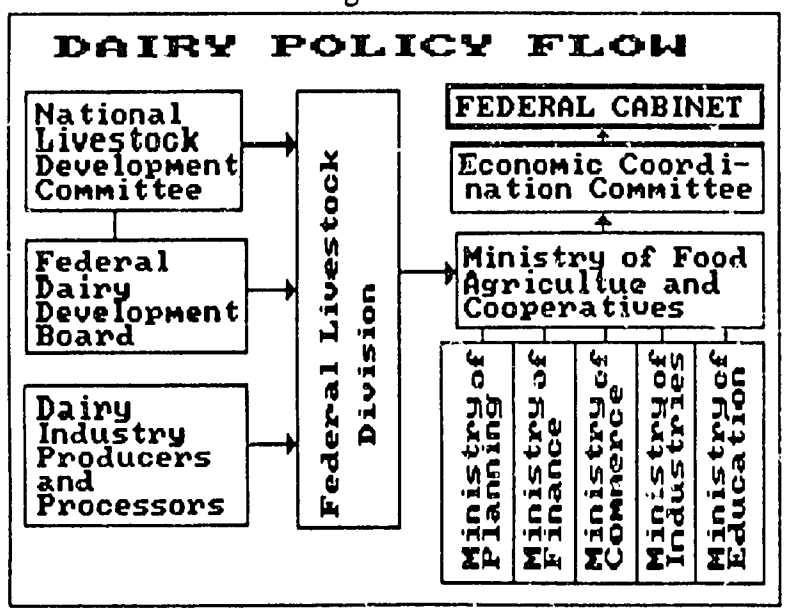
On an overall basis, UHT is an inherently expensive process. If all the various taxes and regulations affecting the cost of UHT milk were removed, it would still remain as a relatively high priced product beyond the reach of most consumers. It is the highest priced milk on the market. Under 1987 market conditions, UHT milk was nearly 40% higher priced than raw milk and 25% higher than whole milk powder. To promote the consumption of hygienic and quality milk among a larger segment of its population, Pakistan will have to look towards alternative technologies, particularly pasteurization.

The earlier experience with pasteurization plants in the 1960s and 1970s was not successful. A large part of the failure was probably due to the public sector orientation with emphasis on "recombined" milk, inadequate marketing, and poor management. Conditions for marketing pasteurized milk are now more favorable because the marketing infrastructure has improved. There are now chilled distribution facilities for ice cream, yoghurt and soft drinks and home refrigeration capacity has grown significantly. With the experience gained in rural milk collection from the early pasteurization plants and the more recent UHT plants, milk for new plants could be collected regularly. The market has grown not only for direct home consumption but for byproduct use. A number of byproduct plants pasteurize milk before using it in making ice cream, yogurt or industrial baking.

Regulation and Policy Making

Dairy policy in Pakistan is largely set at the legislative level in the province and by the federal government. Policy for the most part sets the goals to be reached and the resources to be used in reaching the goals while the bureaucracy establishes and enforces regulations that support these goals. Agriculture is constitutionally a provincial subject. However, the provincial governments operate within an overall policy framework for agriculture, decided in consultation with the federal government. Dairy policy making is a multi-layered process as shown in Figure S-11. The several agencies and ministries, through bilateral communication, eventually come to a consensus on national policy.

Figure S-11



The Ministry of Food, Agriculture and Cooperatives (MINFA) is the central agent in the policy flow. The MINFA minister chairs both the National Livestock Development Committee and the Federal Dairy Development Board. MINFA is the main conduit through which all information regarding policy recommendations is directed. MINFA acting through consensus with other ministries offers policy recommendations to the Economic Coordination Committee of the cabinet. After consensus has been reached on the policy matter at the legislature, cabinet or EC Committee level the policy matter is referred back to MINFA and the concerned agencies for implementation. Only issues requiring policy changes are resolved through this process. Others are considered and adopted at the ministerial level. The approvals are coordinated through the Livestock Division to the respective agencies or provincial governments for the next phase of implementation.

A series of local and national committees are the initiators of new policies and changes in old policies. These include the National Livestock Development Committee and the Federal Dairy Development Board. In some cases dairy producers and processors make their own recommendations to the Federal Livestock Division.

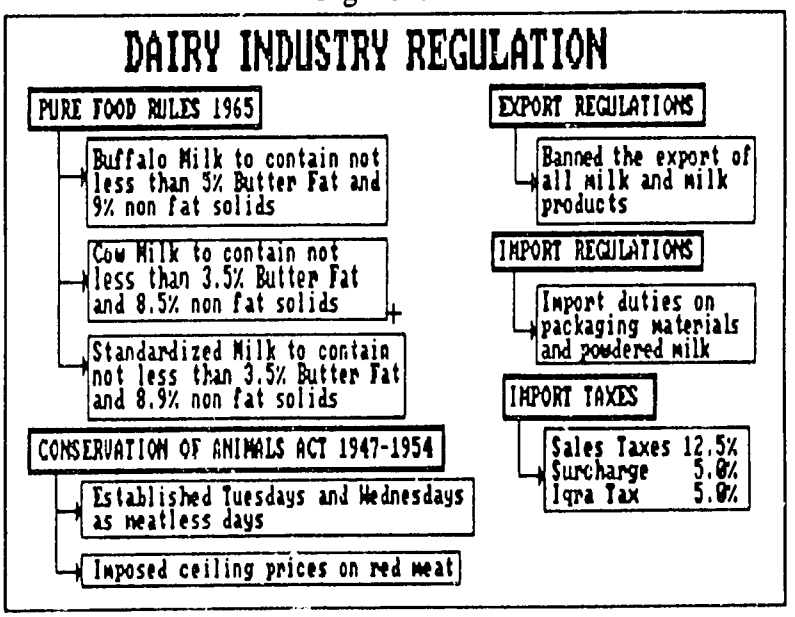
The National Livestock Development Committee was established in 1975 to recommend national action programs concerning imports and exports of livestock, poultry and livestock products, imports of livestock inputs and the allocation of government imported powdered milk and feedgrains. The committee is also required to recommend provision of necessary incentives for livestock and poultry development in the country.

The Federal Dairy Development Board was organized in 1979 and includes all agencies and ministries concerned with dairy policy. The scope of work for the Federal Dairy Development Board is rather comprehensive including milk production, trade and pricing, research and training, industry development, legislation required, and imports of all manufacturing imports.

Dairy policy is largely a part of the national and provincial livestock policy. The main objectives of the livestock policy are: a) to reach and maintain self-sufficiency in milk and meat production, and b) to achieve stability of the livestock resource base. These objectives are to be achieved in a way that not only allows the growing population to purchase livestock products at an affordable price but which also provides the livestock producers a fair return on their investment. These objectives are well supported through government's non-intervention in the production and processing of milk. Milk processing plants qualify for a number of incentives such as duty free import of machinery and equipment and low cost loans through the Agricultural Development Bank of Pakistan. Producers are allowed duty free import of semen and embryo transplants of exotic breeds, and support from credit programs. On the other hand, consumer's interests are taken into consideration with Pure Food Rules, the Conservation of Animals Act, and export regulations. A summary of regulations that are used to achieve the goals of the dairy part of the livestock policy are shown in Figure S-12.

The regulations shown here have been developed over time and from time to time are outdated. For example, with the current over capacity problems of the UHT industry the ban on exporting milk and milk products needs to be lifted. Also, to encourage lower processing costs, the requirement for 8.9% SNF content needs to be lowered to the national milk content of roughly 8.5%. Other regulations that are dated and need review are those for meatless days and red meat price ceilings under the Conservation of Animals Act.

Figure S-11



Tracking Livestock Numbers

Overall dairy policy making and tracking of policy impacts depend on production, consumption and price information. There is a serious need for at least annual information on the dairy production base. This would include an annual enumeration of cattle numbers by age, sex and use, and associated estimates of milk, meat and by-product production. Current estimates do not show the year to year changes in numbers of cows and buffaloes

due to drought and other factors that determine the cattle cycle. As a result, the current estimation cannot be used from year to year to track the impact of policies such as meat price ceilings or the growth in tractor powered farming. The usual procedure of obtaining annual estimates of livestock numbers by interpolating inter-census periods using static growth rates does not provide authentic evidence as to what is happening to the livestock resource base over time. This is especially important as incomes rise and as families attempt to upgrade diets with additional meat and dairy products.

Seasonality of Production, Consumption and Prices

The production and consumption of milk and milk products are characterized by seasonal fluctuations. Milk production is at its maximum during the winter months (December-March) and at its lowest during the summer (May-August). The decline in production is, for the most part, due to the hot weather and to reduced fodder availability. Milk and milk products consumption, on the other hand, is at its peak during summer months and declines by about 25 percent during the winter months. It is thought that milk production fluctuation is greater for subsistence farmers than the more commercial and peri-urban producers. Commercial producers are able to feed their cattle appropriately during the summer season and generally manage breeding and production more effectively.

Even when seasonal fluctuations in supply and demand become severe, there is usually no significant change in fresh milk prices paid by consumers. The price may increase periodically but it does not exhibit an obvious relationship to seasonal fluctuations. It appears that during the hot summer months more ice and water are added to milk so that the consumer buys the same or greater quantities of a more diluted product. Instead of price changes, the same (or higher) demand is met through the addition of ice in milk during the seasonal period of lean supplies. Also, as long as the price of imported milk powders remains favorable, milkmen can expand supplies from that source to meet any additional demand.

In Summary

From the discussion above and broader implications of the report several recommendations seem apparent: No more UHT plants need to be built or sanctioned. In addition, lending policies of the financial institutions must be reviewed to eliminate overinvoicing and over building. Efficiency of the processing industry and growth in its market can be promoted by the development of a market economy based milk processing industry. This can be accomplished by removing the export ban on dairy products and price controls on mutton/beef, reducing import duties on packaging materials, and revising SNF standards. Finally, because of the importance of milk to the food supply, it is necessary to take a livestock inventory on a yearly basis for regular monitoring of the impact of dairy policies and to provide correct diagnoses in crises situations.

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1. OVERVIEW OF PAKISTAN'S DAIRY SECTOR

1.1 Introduction

Livestock and livestock products represented about 31 percent of agricultural Gross Domestic Product (or 7.4 % of overall GDP) in 1986-87. Milk clearly is the dominant component of livestock and livestock products. An estimated 5.5 million households own some buffaloes, cattle, sheep, and/or goats, in all possible combinations. The 1976 Livestock Census showed 4.0 million households owning cattle, and 3.4 million owning buffaloes. The total number of households was about 16.28 million. Thus nearly 45 percent of the households had either buffaloes or cattle.

According to FAO sources (4), the population of buffaloes was 12.7 million, and that of cattle was 12.8 million heads in 1986-87. So, if each household held the same number, the average number of buffaloes would be 3.7 and cattle about 3.2 heads. Thus, since some production units are larger, it is evident that livestock units of one, two, three, or four animals are numerous. Further details of such estimates are provided in other reports (5). The now dated 1976 Livestock Census indicated that 55 percent of the buffalo owning households had only one or two buffaloes and another 28 percent had three or four. For cattle, 39 percent of the households had one or two, and 29 percent had three or four animals. The 1976 data represent different conditions with respect to cattle because fewer cattle are now used for draft due to tractorisation of farming.

Milk production is a major part of agriculture in Pakistan. More specifically, it is an important enterprise for over five million households owning buffaloes and/or cattle. This major farm enterprise started with rural households that kept a few milk animals, mainly buffaloes, for milk production to be used directly by the household. The 1986 Livestock Census estimates indicate a population of 33.4 million heads of buffalo and cattle in Pakistan as against 25.5 million heads estimated by FAO. Livestock Division estimates prepared by extrapolating the 1976 Livestock Census, however, show cattle and buffalo population equal to 30.6 million for the year 1986. These differences in estimates of livestock numbers create many problems for the planners for developing future growth strategies. In the context of total fresh milk production and marketing, these variations bear much greater significance. Livestock Division estimates, as reported by the Economic Survey 1986-87, indicate a total milk production of 12.2 million tonnes in the country.

The collection of milk from individual producers and the distribution to other households is handled mainly by small scale operators, and little is processed in large scale commercial industry. Milk collection activity is evident everywhere in the rural areas in the form of dodhis, on motorbikes or bicycles, bearing containers of milk. These same operators distribute milk daily in urban areas. Beyond this level, however, the milk industry is more complex and subject to a number of pressures. Production faces rising feed costs, especially near the cities and throughout southern Sind. The traditional collection system is under frequent criticism, perhaps most heavily for its widespread practice of adulteration, which affects milk quality, and the practice of collecting only morning milk. The adulteration and

quality issues, to some extent, result in suspicion that marketing margins are excessive. Currently, there also exists a major concern about overbuilding in the capital intensive but small UHT milk processing sub-sector.

All milk production, including the milk of goats and sheep, is mentioned briefly in describing the entire industry. However, goat and sheep milk production is not discussed in the body of the report dealing with marketing and processing because this milk does not enter the marketing process.

1.2 Location of the Livestock Industry

Geographically, the livestock industry is concentrated in the Punjab, particularly around Lahore (Table 1.1). The general environs of Lahore include much of all types of dairy enterprises, from subsistence to large/innovative production units and to cattle colonies. The area from Karachi to Hyderabad in Sind province includes the largest Landhi Cattle Colony and a variety of other types of livestock units, but relatively fewer integrated farming and milk production units of a mixed farming character exist there. Milk production in NWFP and Baluchistan is principally cattle based. These provinces have better conditions for cattle and show continued heavy use of cattle for draft.

Table 1.1 Dairy Animal Population (Million Heads) by Province, 1986

		Punjab	Sind	NWFP	Baluchistan	Total
Buffalo	No	11.15	3.22	1.26	0.07	15.70
	(%)	(71)	(21)	(8)	(0)	(100)
Cattle	No	8.82	3.87	3.28	1.57	17.54
	(%)	(50)	(22)	(19)	(9)	(100)
Total	No	19.97	7.09	4.54	1.64	33.24
	(%)	(60)	(21)	(14)	(5)	(100)

Source: 1986 Livestock Census, Govt. of Pakistan.

1.3 Farm Production Systems

Dairy farming is distributed widely across Pakistan. Most herds are small, averaging around four animals per herd and are part of a farming system that involves crops and other livestock. Almost all farms in Pakistan have cattle or buffalo, or at least sheep and goats. Dairy is also a major enterprise of landless farmers who keep, roughly, one third of the total dairy animals.

The dairy buffalo dominates the milk production scene by accounting for roughly three fourths of all milk produced in Pakistan. The Nili-Ravi breed is most popular and is considered very productive by international standards. These buffaloes appear to thrive in most parts of Pakistan. Cattle, on the other hand, are not tolerant to the hot summer months of Pakistan. The Sahiwal and Red Sindhi breeds of cattle are most popular and appear to be less affected by heat than Friesians and Jerseys.

Dairy farming enterprises are classified into eight major production systems by the FAO/ADB study and the Report of the National Commission on Agriculture. These systems which include four buffalo milk production systems and four cow milk production systems are summarized as under.

Figure 1.1 presents the buffalo milk production systems. Among these, the rural subsistence system is most common. Feeding, under this system, includes grazing on national lands, forages that can be gathered from uncultivated areas and, occasionally, purchased feeds. Improved concentrate or high protein feeding is seldom practiced. Breeding is based on available animals. Artificial insemination is not often used. Milk produced is usually completely consumed by the household. Residual milk is often converted to ghee (butter oil) and lassi (butter milk).

Figure 1.1

BUFFALO MILK PRODUCTION SYSTEMS

	COMMERCIAL	PERI URBAN	RURAL MARKET ORIENTED	RURAL SUBSISTENCE
Yearly Production Per Cow (Kgs.)	2510	2460	2060	1200
Cows Milked (000)	15	460	1334	2246
Characteristics: Herd Size	40 or more	5 to 20	5	3
Location	Major Market	Urban Market	Market Access	Limited Market
Feed, Breeding & Management	Advanced & Modern	Advanced, Buy Feed	Grow & Buy Feed	Public Grazing
Equipment	Includes Pasteuriz-ation eq.	Limited	Little	Little
Animal Management	Productive Cows Kept	Slaughter Cows & Calv.	Productive Cows Kept	Productive Cows Kept

The **rural market oriented** production system usually involves a larger herd that is part of a farm. Buffaloes in milk are fed in stalls on straw, fodder and concentrates. Most of the feed comes from the residues of crops grown on the farm. Dry buffalo cows and calves are grazed on the farm and on publicly owned areas. Upgrading through breeding to improved animals is a common practice.

The **peri urban** production system is largely a commercial venture with a market orientation. Dairy buffaloes are located around urban areas, often in dairy colonies. In this location the owners have easy access to the urban market where they sell fresh milk. Feeding is more extensive, including fodder and concentrates. However, commercially mixed feeds are not used. Breeding practices are limited because nonlactating buffaloes and calves are usually slaughtered and the meat is also sold in the nearby markets. It is also common practice for urban families to keep a buffalo in their back yard.

The **commercial** production system involves a larger herd size and depends on superior management to achieve high levels of production. These systems are the innovators of the industry. Some have pasteurization units and other processing equipment. They often practice progeny testing and use artificial insemination to take full advantage of superior male stock. However, they produce an insignificant proportion of total milk production.

Dairy cattle farms are much less popular in Pakistan. Buffalo milk, with its higher butterfat content is preferred by consumers and the buffalo with higher levels of heat resistance and stamina are preferred by the producers. Cow herds are kept for draft and milk. As tractor power has grown cows are being slaughtered or kept for meat and milk. Figure 1.2 presents the different cow milk production systems which are briefly described below.

Figure 1.2

COW MILK PRODUCTION SYSTEMS

	PROGRESSIVE FARMS	PERI URBAN	IRRIGATED FARMS	BARANI FARMS
Yearly Production Per Cow (Kgs.)	2530	1840	860	450
Cows Milked (000)	10	71	1559	960
Characteristics:				
Herd Size	30 or more	20	4	4
Location	Major Market	Urban Market	Market Access	Limited Market
Feed, Breeding & Management	Advanced, grow & Buy Feed	Advanced, Buy Feed	Grow & Buy Feed	Public Grazing
Equipment	Limited	Limited	Little	Little
Animal Management	Productive Cows Kept	Slaughter Cows & Calv.	Productive Cows Kept	Productive Cows Kept

The **barani farm** systems consist of cows that have been kept for draft. Because they are used for power, less milk is produced. Cows are fed on stubble in waste areas and pastures and are usually bred with available bulls without regard for genetic improvement.

The **irrigated farm** systems, like the barani systems, use cows for draft power with milk and meat production considered as byproducts. Exotic breeds as Holstein-Fresian and Jersey cattle are not used due to heat stress but some improved breeding is practiced.

The **peri urban** system, as the name implies, is located near an urban market and produces milk for sale. Cross breeding is a common practice to improve production as well as the use of feed concentrates. There are few units of this nature since cow milk does not sell as well as buffalo milk.

The **progressive farm** is the exception. These units involve milk sheds, feed mixing equipment, milk chilling equipment, and special small trucks equipped to haul milk. They are often attached to processing facilities that use cow milk in combination with buffalo milk. They also make special efforts to produce and sell cow milk during the low buffalo milk production period.

In summary, the foundations of the dairy industry rest on subsistence farming with buffalo or cattle kept for draft and to provide for the milk needs of the household. The pattern of keeping one to five animals for home needs and sales is common. This pattern is followed on by dairies located in and near urban areas. More commercialized milk production is developing slowly, both as a source of moderate cash income and for supplying to the growing urban population.

1.4 Milk Consumption

Milk and milk products are key items in the diets of most people, representing 27 percent of total household expenditures on food items as indicated by the Federal Bureau of Statistics (FBS) **Household Income and Expenditure Survey of 1984-85**. Expenditure, in this context, includes consumption in milk producing households. Indeed, such intra-household production and consumption may account for over 50 percent of buffalo's and cow's milk. However, the proportion of milk consumed by the producer's own household is giving way to marketing of the product.

As a food group, all milk (milk and milk equivaients) is second only to cereals in level of per capita consumption. By weight, all milk makes up nearly one third of all food consumed. It is consumed as fresh, boiled, powdered and processed milk, and as yogurt, ghee, lassi, butter, cheese, ice cream, sweetmeats, and other confectioneries. About half of the all milk food group, is consumed as fresh or boiled milk, about one fourth as ghee, and one sixth as yogurt or curd.

Apparently, as incomes improve, the average Pakistani has begun to diversify his diet, consuming a larger proportion of vegetable oil, fruits, vegetables, pulses, meat and eggs.

The apparent diversification has led to lower levels of all milk and cereal consumption. However, the consumption of fresh and boiled milk per capita has trended upward. Figure 1.3 shows consumption by food groups.

Consumption of both cereals and all milk have declined while the consumption of most other food groups has increased. The decline in cereals is due largely to reduced wheat consumption. Rice consumption has remained relatively steady. The decline in the consumption of all milk, as shown in Figure 1.4, was due, almost entirely, to reduced consumption of ghee made from milk. The consumption of ghee made from milk dropped from an estimated 2.5 kgs. per year in 1971/72 to 1.2 kgs. in 1984/85.

The large drop in consumption of ghee made from milk released additional milk for fresh and boiled milk use. At the same time ghee made from milk was replaced with vegetable ghee. The consumption of vegetable ghee has almost tripled from 2.4 kgs. per year in 1971/72 to 6.9 kgs per year in 1984/85. While the consumption of all milk has been trending downward, the consumption of fresh and boiled milk per capita has been rising as shown in Figure 1.5.

1.5 Milk Processing

The first significant modern processing plants came in the 1960s and 1970s when 23 processing plants were established, four in the public sector and 19 in the private sector. Government provided tax holidays for investments and exchange rates were favorable to the import of equipment. This development, which was based on milk pasteurization, virtually failed with most plants essentially abandoned and, thus, creating a bad reputation for pasteurization.

Figure 1.3

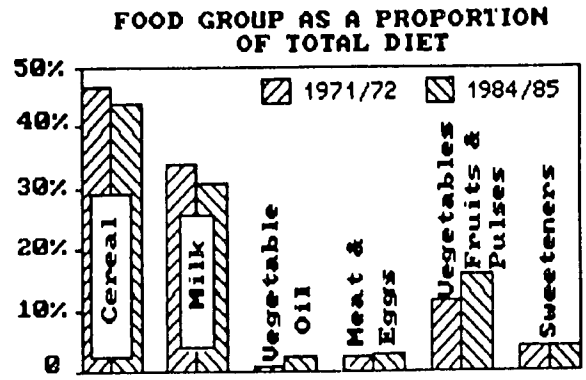


Figure 1.4

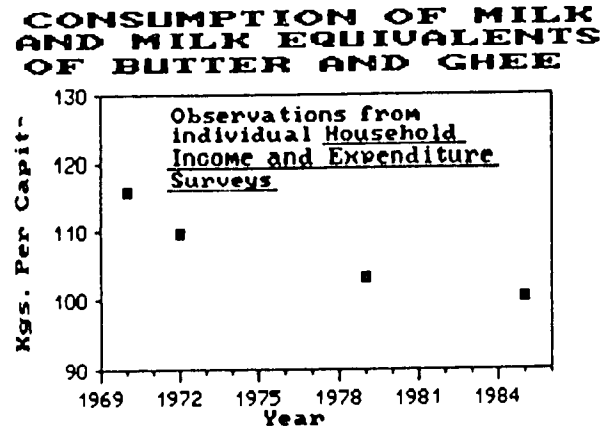
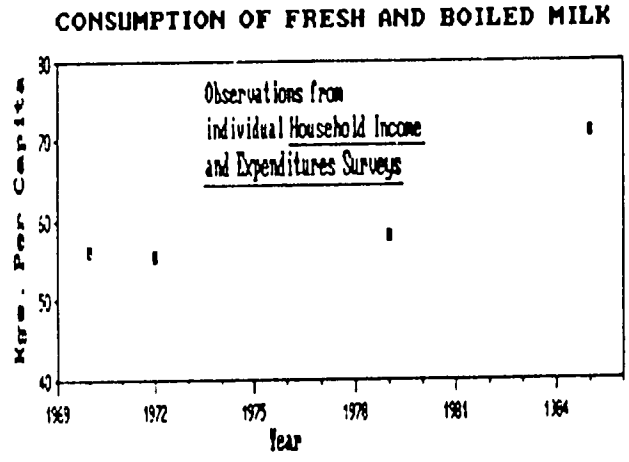


Figure 1.5



Next, advanced technology in the form of UHT (ultra high temperature) processing and aseptic packaging was introduced in the 1980s with nine operating plants in November, 1987, and at least financial commitments for 15 more plants. This development is discussed in detail in Chapter 2.

1.6 Milk Marketing Channels

The highly perishable nature of liquid milk demands not only prompt collection from producing areas but also its quick distribution. Most of the milk produced in Pakistan comes from millions of small landholders or landless people keeping livestock. These farmers, whose main occupation is crop production, keep a few dairy animals for milk production either for home consumption or as a supplementary source of income. In rural areas where road linkages are relatively better or where milk processing plants have established milk collection centers, farm families, in general, sell milk to the Katcha dodhis who are the backbone of our present day milk collection system.

Figure 1.6 is a presentation of the milk marketing channels as envisaged by the study team. The three major milk production systems, namely rural subsistence, rural market-oriented, and peri-urban plus commercial, have been indicated separately to provide a relatively better picture of milk as it moves from producers to consumers. Most of the milk produced by subsistence farmers, in the absence of marketing opportunities, is consumed at home as fresh milk or converted to ghee for own consumption or selling to other rural households. A portion of the ghee produced is also sold to urban consumers especially to those who have family linkages in rural areas. Some of the more important functionaries in the milk marketing system are discussed below.

1.6.1 *Katcha Dodhi (First Stage Milk Collector)*

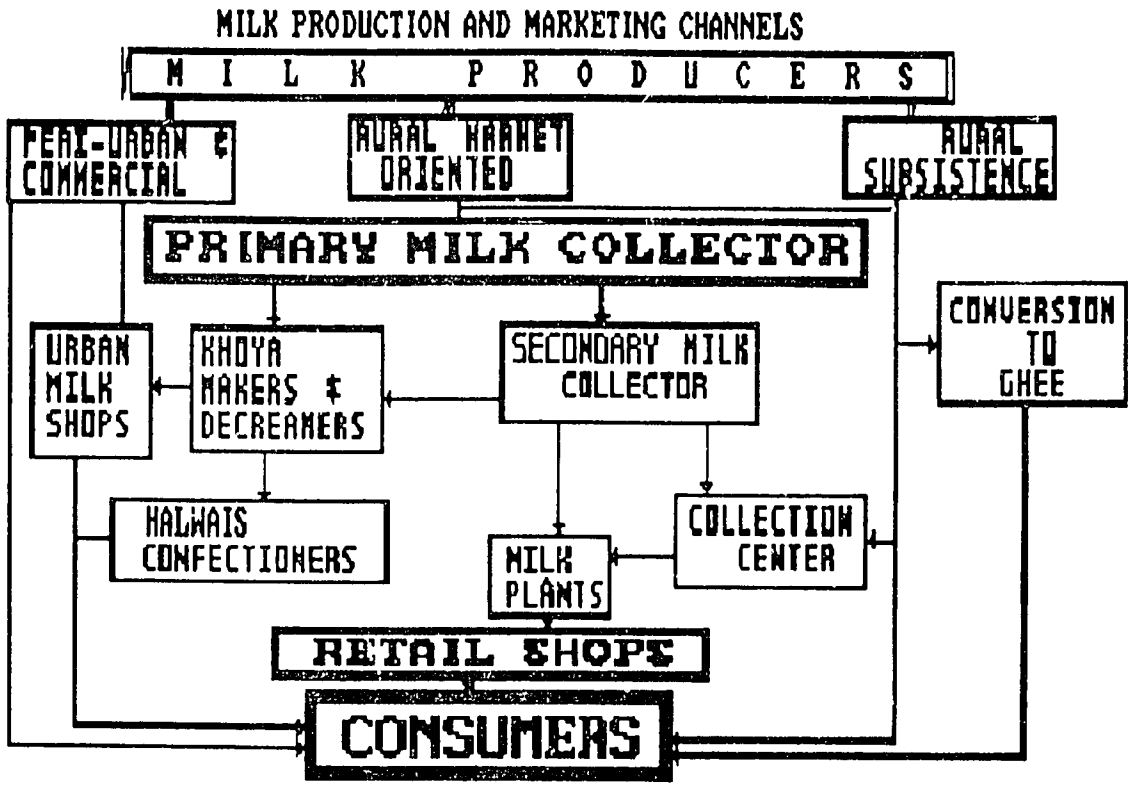
As mentioned earlier, Katcha dodhi serves as the linkage between millions of small producers and consumers. He collects the small marketable surpluses of fluid milk from several farm families and transports it either directly to consumers or to the milk collection centers. Other options available to him are the urban/small town milk shops or Khoya-makers. Majority of the Katcha dodhis use bicycles as a means of transport and can carry a maximum of 80-100 kgs of milk in each trip covering a distance of 6-10 kilometers. Very seldom do they make a second trip.

Generally, they advance money to producers, which benefits both. It ensures the milk collector of a regular supply and also results in reducing the marketing risks of the producers. These credits range between Rs. 200- 1000 depending on the marketable surplus of the producers and are repaid with milk supplies rather than cash payment. By using different measuring devices, Katcha dodhis can pay virtually any price to small farmers depending upon the amount of credit advanced, other options available to a particular farmer, season and proximity to market etc.

1.6.2 *Pacca Dodhi (Second Stage Milk Collector)*

Carrying capacity, which is determined by the type and size of transport available, is the only factor that differentiates between a katcha dodhi and a pacca dodhi. The latter either has a horse-driven cart or a small pick-up truck and thus can carry upto 500 kg milk in one trip. His supplier, in most cases, is also the katcha dodhi who on his own is unable to transport milk beyond 6-8 kilometers.

Figure 1.6



Pacca dodhis either sell their milk to the collection centers where they get paid according to the butterfat percentage. Others take their milk to cream-traders (decreamers) who have installed a decreaming unit at a convenient roadside location. Only a portion of the total milk (usually 20-25 percent) is decreamed. Cream is sold to the decreamer and the skim milk is recombined with the whole milk. The process of decreaming is simultaneously used to control the quality of milk supplied by the katcha dodhis as unadulterated milk should have a 10 percent cream content. The pacca dodhis, in general, do not sell to collection centers but instead supply their milk to shops in urban areas where quality as measured by butterfat content is hardly a matter for concern.

Peri-urban and commercial milk producers sell directly to consumers, milk shops, and to larger establishments through contracts. Producers in the largest cattle colony in Karachi generally enter into monthly, quarterly, six monthly or even annual contracts with milk consumption establishments, milk shops and other large urban consumers. The length of

these contracts depends mainly on production stability and past price behavior. Under the terms of a contract, the producer is bound to supply a certain quantity of milk on a daily basis at an agreed price during the contract period. Based upon their mutual dependence and trust, the price may be adjusted every month or revised as and when agreed by both the producer and the seller. Small scale producers, however, dispose of their milk supplies through home delivery or direct sales in the "Lee Milk Market" in Karachi.

1.7 Current Issues

The most urgent problem in the dairy industry is the overbuilt UHT processing sub-industry. Recent sharp increases in the price of dry milk powder concern milk processing plants since such increases not only raise costs but reverse the traditional price advantage of extending available milk by adding milk solids from skim milk powder. Also, some owners of UHT plants are not satisfied with the quality of packaging material supplied and costs of replacement parts, etc. Users of alternatives to the dominant Tetra Pak packaging consider the structure of import duties and charges as discriminatory. Finally, livestock feed costs have increased, especially in the Karachi peri-urban area.

An array of other issues affect the milk industry: will sufficient milk be produced and sold without higher prices to consumers? will sufficient feed be available without a sharply higher price? can dilution and contamination be reduced to make milk more healthful and to provide clearer market signals?

1.8 Thrust of Analysis

The general scope of work for this analysis reads: "The main focus of the dairy study is to review the current status of the dairy sector in Pakistan with major emphasis on an in-depth analysis of the milk processing industry to determine appropriate levels of processing that will balance the processed milk (and products) market with the fresh milk market. The study shall also develop a set of alternative dairy sector policies keeping in view small farm equity and the consumer's need for quality milk."

The study report includes an overview of the structure and basic performance of the industry in each major stage from milk production through collection, processing, and distribution. The principal focus, however, has been on the processing sector. Actual processing, and certainly milk packaging, involve rather minor amounts at present but face critical problems. The current and prospective role of milk processing, from traditional methods to highly capitalized production of new and old products, is viewed as critical. The analysis also considers that both new and old forms of processing may be applied to relieve current and anticipated problems. The economics and role of various arrangements for chilling milk quickly after production is an important topic. It is much simpler to suggest the benefits from certain applications of processing than to determine what approaches most likely are economical. As the scope of work suggests, this is intended primarily as an economic analysis and policy options are considered in the light of such analysis.

2. MILK PROCESSING SECTOR

2.1 Background

The first attempt to establish a modern dairy sector in Pakistan began in the early 1960s and about 23 processing plants were set up over the next two decades. Most of these were in the private sector. The processing facilities established during this period included pasteurization and sterilization plants as well as others specializing in the production of milk powder, butter, ice cream and cheese.

Although most of the investment in modern milk processing capacity was made by the private sector, a number of important projects were also initiated by the government. Of particular significance were the three pasteurization plants established in the public sector with the assistance of UNICEF, FAO and the World Food Programme (WFP) at Karachi, Lahore and Islamabad. These plants were set up with the objective of supplying milk to the large and growing populations of those cities in part by recombining skim milk powder and butter oil made available through the World Food Program.

However, with the exception of a few specialized dairy processors, most milk plants set up during this period operated considerably below capacity and eventually closed down. The public sector plants needed large amounts of financial assistance to continue operating and ultimately all but one of them were also closed. The major factors responsible for the failure of what are often referred to as Pakistan's "first generation" dairy plants were :

(a) the inability to procure sufficient quantities of milk,

(b) marketing problems related to the short shelf life of the product without refrigeration,

(c) weak consumer acceptance,

(d) poor management, and

(e) lack of trained dairy technologists and plant technicians.

Problems with market acceptance were attributed in part to the consumers dislike of the taste of "recombined" milk as compared with that of fresh milk. The short shelf life of the product without refrigeration was also regarded as a particularly serious constraint. In fact, the failure of the "first generation" milk plants was widely perceived to be due to the inappropriateness of pasteurization as a processing technology for Pakistan given the high ambient temperatures in the summer as well as the under-developed state of its marketing infrastructure.

The closure of over 15 dairy plants in the 1960s and 1970s represented a setback to the development of a modern dairy industry in Pakistan. Apart from the obvious capital losses

involved, the experience clearly affected the confidence of potential investors. It was many years later, and not until the success of a new venture had been demonstrated in the marketplace, that investors again showed interest in the sector.

In 1977, Packages Limited, a large paper and paperboard manufacturer, leased a small inactive sterilization plant to test the possibility of producing UHT (ultra high temperature) milk in aseptic paperboard cartons. UHT treatment involves heating the milk at 130-150 degree centigrade for 2-3 seconds only. Compared to pasteurization in which the milk is heated at 72 degree centigrade for 15 seconds, the UHT exposure produces a correspondingly high bactericidal effect and when packed aseptically, this milk has a shelf life of several months without refrigeration. Although UHT was a relatively expensive process, these characteristics were regarded as desirable since they considerably eased marketing problems associated with the distribution of a highly perishable product. To develop the aseptic packaging material, Packages Limited collaborated with Tetra Pak, a Swedish multinational firm specializing in the production of aseptic liquid packaging.

Packages Limited operated their pilot project for nearly four years. The experiment with UHT proved successful and a new company called Milkpak was set up which established a larger plant at Sheikhupura with financial assistance,among others, from the International Finance Corporation (IFC) and the Agricultural Development Bank of Pakistan (ADBP). This plant, which went into production in 1981, also met with quick success at the marketplace. Meanwhile, Packages Limited and Tetra Pak (Sweden) also established Tetra Pak Pakistan Limited as a joint venture to produce aseptic packaging material in Pakistan.

Largely due to the successful introduction of UHT milk, tax incentives provided in the form of duty exemptions on the import of dairy plant machinery and the availability of domestic and foreign currency financing, there was renewed interest in milk processing in the mid-1980s. Between 1983-87, five new UHT milk plants were set up and UHT capacity was added to an existing pasteurization plant. By the end of 1987, a further 15 UHT plants had been sanctioned and were at various stages of implementation.

The ADBP played a leading role in providing financing for the investment in UHT capacity. Various foreign currency credit lines available to it from the Asian Development Bank enabled the bank to aggressively promote the technology in Pakistan. Of the 24 UHT milk plants sanctioned, ADBP alone accounted for 14. Other sources of financing for UHT plants included the Industrial Development Bank of Pakistan, Pakistan Industrial Credit and Investment Corporation and the National Development Finance Corporation.

There is now serious concern that too much capacity has been created in the UHT industry in relation to demand. Existing plants are operating below capacity and the growth in demand for the relatively high priced UHT milk is not likely to keep pace with the planned increases in production capacity. Reflecting these concerns, the ADBP has placed a moratorium on further lending for UHT plants in the Punjab while the Asian Development Bank has also reportedly expressed its reluctance to finance any additional UHT capacity.

Nevertheless, the coming years will be extremely difficult ones for the industry particularly when the capacity currently being installed comes on line. As the specter of plant closures

raises its head again, there is considerable uncertainty regarding the role of the relatively high cost UHT technology in the future development of the dairy industry in Pakistan.

2.2 Installed Capacity

In November 1987, there were twenty-one major dairy processing plants operating in Pakistan. Of these, eight were UHT milk, seven ice cream and three yogurt manufacturing plants. The rest were specialist producers of dried milk powder, butter and cheese. Altogether, these plants had an estimated raw milk processing capacity of over 750,000 litres per day which represents less than 3 percent of the total milk produced and 7 percent of that marketed in the country. UHT plants accounted for over 80 per cent of the milk processing capacity in the modern dairy sector.

Table 2.1 provides information on existing UHT milk plants in Pakistan. All the existing UHT plants are in the private sector except for the Lahore Milk Plant which is operated by the Punjab Livestock and Dairy Development Board. Of the plants listed above, all but one are located in the province of Punjab.

UHT milk production capacity is likely to double in the next few years: another 15 plants are being constructed or planned and are expected to go into production by 1988-89. As Table 2.2 shows, these plants will add another 775,000 litres per day to the existing capacity.

Table 2.1 Existing UHT Milk Processing Capacity

NAME OF PLANT	LOCATION	START UP DATE	PRODUCTS	INVESTMENT COST (Mill Rs.)	CAPACITY [1] (Litres/day)
1. Milko	Lahore	1977 [2]	UHT milk	30	50,000
2. Milkpak	Sheikupura	1981	UHT milk, cream, butter, fruit juices, desi ghee	93	150,000
3. Pakistan Dairies	Sahiwal	1983	UHT milk	40	50,000
4. Lahore Milk Plant	Lahore	1984 [3]*	UHT milk, yogurt, butter	50	80,000
5. Kabirwala Dairies	Multan	1984	UHT milk	50	50,000
6. MAS Dairies	Hyderabad	1984	UHT milk	50	80,000
7. Sheerpak	Sadiqabad	1984	UHT milk	55	50,000 [4]
8. Chaudhri Dairies	Kasur	1986	UHT milk, min. water	90	100,000
9. Milkways	Tandlianwal	1987	UHT milk, yogurt	90	65,000
Total				548	675,000

[1] Based on two shifts including cleaning and preparation
[2] Pasteurization plant established in 1967 but remained closed until leased by Packages Ltd. in 1977.
[3] Established in 1967 as a pasteurization plant. UHT capacity added in 1984.
[4] Temporarily closed.

Source : Pakistan Dairy Association

Table 2.2 UHT Milk Processing Capacity under Construction and Planned upto 1989

No.	NAME OF PLANT	LOCATION	CAPACITY (2 shifts) (Litres/day)
1.	Unimilk	Okara	50,000
2.	Mubarik Dairies	Jhang	50,000
3.	General Dairies	Thatta	50,000
4.	Pakpattan Dairies	Pakpattan	50,000
5.	Al-Hayat Dairies	Sanghar	80,000
6.	Haq Dairies	Gujranwala	80,000
7.	Sialkot Dairies	Sialkot	50,000
8.	Zakia Dairies	Islamabad	20,000
9.	Neeli Dairies	Vehari	50,000
10.	Bhittai Food Ind.	Tharparkar	25,000
11.	Quetta Milk Plant	Quetta	20,000
12.	Ravi Ag. & Dairy Products	Faisalabad	50,000
13.	Moro Dairies	Moro	50,000
14.	Dairyland	Peshawar	100,000
15.	Mirpurkhas Dairies	Mirpurkhas	50,000
	Total Capacity		775,000

Source: 1. Pakistan Dairy Association.
2. Agricultural Development Bank of Pakistan.

By 1989, therefore, total installed UHT milk processing capacity in Pakistan will be about 1.45 million litres per day. This translates to an annual production capacity of over 400 million litres of processed milk, or approximately 20 per cent of the liquid milk presently consumed in urban areas.

Five specialized yogurt manufacturing plants are also being constructed and are expected to go into production by 1989. In addition, a number of existing and planned fruit juice plants are adding yoghurt manufacturing lines to their projects.

A small pasteurization capacity also exists in Pakistan though most of it, except for that being utilized by the Lahore Milk Plant, is lying idle. There are plans to reactivate some of this capacity. The ADBP is providing financial assistance to revive Amsons Dairies, a pasteurization plant in Karachi closed since the 1960s. The government has reportedly leased the public sector Karachi Milk Plant to a private operator. A small pasteurization plant has also been imported for the Pattoki Livestock Production Project which is being implemented by the Government of Punjab with assistance from the German Agency for Technical Cooperation (GTZ).

2.3 Investment and Employment

No official statistics are available on investment and employment in Pakistan's modern dairy sector. Industry estimate of the investment in existing UHT milk plants is about Rs. 550 million. Given the capacity currently being installed and planned, and assuming an average investment cost of Rs. 60-80 million for a typical plant, total investment in the UHT industry will stand at over Rs. 1.5 billion by 1989. A substantial part of this investment, perhaps as much as Rs. 1 billion or 60 per cent, will consist of borrowing from domestic development finance institutions.

The UHT milk industry appears to be highly capital intensive. Though statistics on the number of persons employed by the industry are not available, information obtained from individual plants indicates that direct employment per plant averages between 100-110 persons. This implies an investment cost of over Rs. 500,000 (US $29,000) per job created. These figures tend to exaggerate the capital intensity of the industry somewhat as they do not take into account job opportunities created for milk collectors/contractors and transporters connected with the milk plants. Nor do they reflect the indirect employment created for rural milk producers and other industries supplying the UHT milk industry. Nevertheless, they do illustrate the highly capital intensive nature of UHT technology.

2.4 UHT Milk Production and Capacity Utilization

Figure 2.1

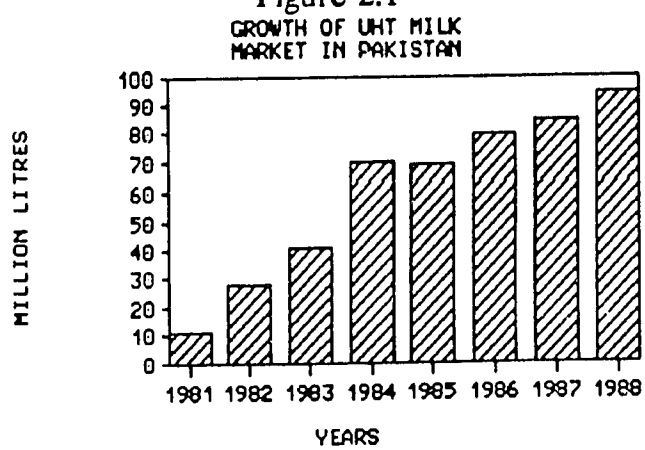


Figure 2.1 graphically depicts the historical growth of the UHT milk market in Pakistan. UHT milk production and sales have grown from 11.25 million litres per year in 1981 to 85 million litres per year in 1987; an annual average growth rate of over 40 percent. However, the same graph shows that the rate of growth appears to have slowed down in recent years. The market for UHT milk is currently estimated to be expanding by 5-10 percent per annum. The growth in the UHT milk market, however, has not kept pace with increases in production capacity. As a result, plants have operated below capacity (Table 2.3). Industry projections indicate average capacity utilization to fall to 26 percent by 1989 when the UHT milk plants now being constructed come on line.

Low capacity utilization appears to be due mainly to constraints on the demand side. However, another factor potentially affecting capacity utilization is the pronounced seasonality of milk production and demand. Demand for UHT milk, and dairy products generally, is highest in the summer months. On the other hand, milk production is lowest during this period. Because of the seasonal imbalance between milk supply and demand, UHT plants experience considerable difficulty in procuring raw milk precisely at the time when demand for their products is high. Ironically, during the winter months, milk plants

are in a position to procure more milk than they can use and are often forced to declare "milk holidays."

Table 2.3 Capacity Utilization of Existing UHT Milk Plants in 1986 (Litres Per Day)

Installed Capacity	535,000
Production	240,000
Capacity Utilization	45%

Source : Pakistan Dairy Association

Seasonal difficulties in raw milk procurement have not necessarily resulted in forgone sales until now as plants have tended to increase the use of skimmed milk powder (SMP) to "expand" available milk supplies in summer months. However, with the rise in SMP prices this year, this option is no longer as attractive as previously which is reflected in the greater efforts at fresh milk procurement being made by UHT plants in recent months. As competition for raw milk supplies intensifies with the commission-ing of new plants, procurement problems may well constrain the utilization of UHT milk processing capacity in the future.

2.5 Industry Structure

Of the existing UHT milk plants, Milkpak Limited holds a market share of nearly 40 percent. The remaining 60 percent of UHT milk sales are provided by the other seven operational plants including the public sector Lahore Milk Plant. All but one of the existing plants depend upon Tetra Pak Pakistan Limited for the supply of packaging material. The exception, Milkways Limited, imports its packaging material from West Germany in the form of 'finished' sleeves.

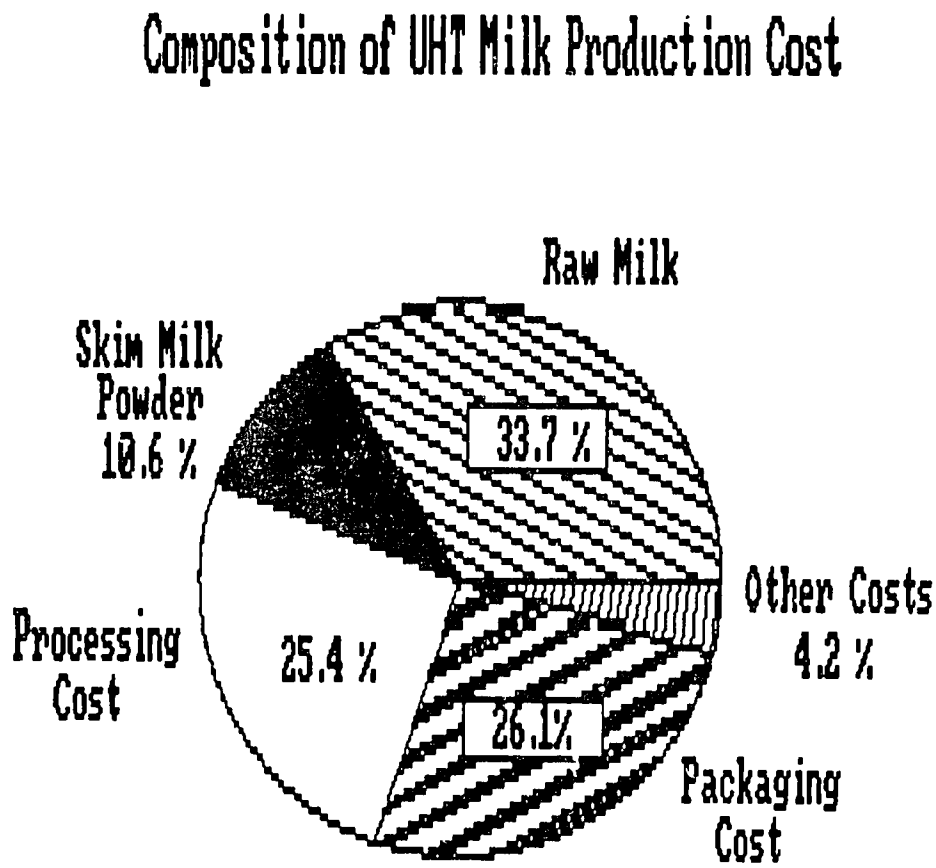
Commonality of interest has led to the establishment of the Pakistan Dairy Association (PDA) of which all UHT milk plants are members. The PDA recommends uniform prices for both the raw milk purchased and processed milk sold by UHT milk plants. It also represents the industry in its dealing with the government. The PDA has occasionally played an important role in influencing government policies, for example in 1986 when import duties were imposed on dried milk powders. However its effectiveness remains limited, in part due to competition and distrust among its members which stems from the close identification of Milkpak, the largest producer, with Tetra Pak Pakistan Limited.

Perceived problems with the suppliers of packaging materials have also resulted in the establishment of the Tetra Pak Users Association (TPUA) of which most UHT milk plants and fruit juice plants, except Milkpak, are members. The creation of the TPUA represents an attempt by users to bargain collectively with Tetra Pak Pakistan Limited, the sole domestic supplier of paperboard carton packaging material for the industry.

2.6 UHT Milk Production Cost

Representative UHT milk production costs were estimated based upon information obtained from individual plants. These are presented in Figure 2.2 and in Table 2.4.

Figure 2.2



The largest component of UHT milk processing costs is raw milk which accounts for 30.6% of total production and marketing costs after adjusting for the value of cream separated. Payment for raw milk by processing plants is based on the fat content of the purchased milk. UHT processed milk is "standardized" at 3.5% butterfat and 8.9% solids not fat (SNF). However, the milk procured normally contains more than 3.5% butter fat but less than the required SNF contents. Therefore, UHT plants either add water to reduce the fat content of the milk or remove the excess fat by decreaming. In either case they add skimmed milk powder (SMP) to raise the SNF level to 8.9 percent required by law though the quantity of SMP addition is obviously higher in the former case. Typically plants do both i.e. extract some butter fat by decreaming and then add water and SMP to raise the SNF level as well as enhance production volumes. However, what option processors ultimately choose to standardize milk depends largely upon SMP and cream prices, the need to expand production to meet market demand and plant cream requirements for the production of other dairy products. At the current SMP price of Rs. 38 per kilogram, it is uneconomic to add water and SMP to increase production volumes. The cost of SMP addition is estimated at Rs. 0.72 per litre or approximately 10% of total UHT milk costs. Given the importance of SMP costs it is surprising that payment for raw milk is based only on the fat content of the milk purchased and not on its SNF level as well.

Table 2.4 UHT Milk Production Costs [1]

Cost Item	Rs/Litre
Raw milk [2]	2.66
Value of cream separated [3]	0.45
Net cost of raw milk	2.21
Conversion to 1 litre volume at 3.5% butter fat	2.28
Skimmed milk powder [4]	0.72
Processing cost [5]	1.72
Packaging cost	1.77
Transportation cost	0.08
Market returns/Replacement [6]	0.20
sub-total	6.77
Distributer's margin	0.19
Retailer's margin	0.50
sub-total	0.69
Total production and marketing cost	7.46
Retail price [7]	7.50
Processor's margin	0.04

[1] Plants of 4 to 8 thousand litres per day capacity.
[2] Price of milk at 5% BF and 7% solid not fats.
[3] Cream (50% fat) valued at Rs. 15 per kilogram.
[4] Adding 19 gms of skimmed milk powder @ Rs.38/kg.
[5] Includes depreciation and financial charges.
[6] Market returns are assumed to be 3 percent.
[7] Retail UHT milk price in Lahore zone. The price in other areas was Rs. 8/litre.

Source: International Consulting Division, Chemonics.

The second largest cost component of UHT milk is packaging cost incurred on tetra pak cartons. This accounts for almost 24% of total UHT milk costs. If market returns and replacements, which are often attributed to the poor quality of packaging material used, are also accounted for, packaging costs amount to almost Rs. 2 per litre of milk produced.

Processing costs add another 23% to the cost of UHT milk. However these costs, particularly the fixed overhead expenses, are highly sensitive to variations in capacity utilization. If UHT plants operated at full capacity, processing costs would fall by as much as Rs. 0.70 per litre. Marketing costs, consisting primarily of distributor and retail margins, represent about 10% of total costs. Based upon these estimates of production and marketing costs, UHT processor margins appear to be practically zero. In fact they are likely to be negative if either lower capacity utilization rates or higher market returns are

assumed. At present, only a few milk plants appear to be profitable. All others are reported to be incurring losses as they are operating well below their breakeven capacities estimated at around 65 percent.

Capacity utilization is expected to fall further as new plants go into production. At the same time, competition among plants is likely to exert upward pressure on raw milk prices. As processing margins are squeezed further, it is difficult to visualize how many of these plants will survive. The newer plants, with their higher fixed operating costs, are likely to be the most vulnerable in the coming years.

UHT milk is considerably more expensive than competing products. Table 2.5 compares its retail price with that of fresh milk and whole cream dried milk powder in different cities in Pakistan. On average, UHT milk prices are between Rs. 1.50-3.00 per litre higher than those of "fresh milk" sold by peri-urban producers and city milk shops and whole cream milk powder packed in polythene bags. However, it appears to be comparable with the price of tinned whole milk powder.

Table 2.5 Comparative Retial Prices of UHT Milk, Raw Milk and Dried Milk Powder in Different Cities in Pakistan.

	RAW MILK		WHOLE MILK POWDER		[2] UHT MILK
	Peri-urban Producer	Milk Shop [1]	Tinned	Polythene bags	
City	Rupees per litre				
Lahore	5.00-6.00	4.50-5.50	7.50	6.00	7.50
Karachi	5.50-7.00	5.00-6.50	6.88	5.50	8.00
Peshawar	5.00-7.00	5.00-7.00	NA	NA	8.00

[1] In general, the quality of milk sold by milk shops is poor relative to that sold by peri-urban producers.
[2] In liquid milk equivalent terms assuming a dried milk to liquid convers on ratio of 1:8.

Apart from being cheaper, the raw milk sold in urban areas also typically has a higher butterfat content than UHT milk for which consumers are reported to have a strong preference. The wide range of raw milk prices indicated in Table 2.5 reflect variations in quality (technically composition in this context) as measured by butterfat content. This provides urban consumers with much greater choice and makes milk affordable to lower income groups. In addition, peri-urban producers or "gowalas" often provide consumers other services such as home delivery and credit sales.

Given the price differential between UHT milk and competing products, it is hardly surprising that the former accounts for less than 5 percent of the total milk consumed in urban areas. At present, UHT milk is bought mainly by middle and upper income groups, as a convenience product and by consumers in milk deficit areas where raw milk prices are higher. Further expansion of the UHT milk market is likely to be slow and difficult unless processors can reduce costs as well as engage in more vigorous product promotion.

2.7 Constraints Facing the UHT Milk Industry

The UHT milk industry represents Pakistan's second attempt to establish a modern dairy processing sector in the country. Like the earlier, largely unsuccessful attempt, it too is beset by a number of problems. The major ones relate to marketing and some of these have already been alluded to in earlier sections. These problems as well as others are discussed below in some detail.

2.7.1 *Overcapacity*

The basic and most fundamental problem facing the UHT milk processing industry is that of overcapacity. There is simply more production capacity already installed or underway than is warranted by even the most optimistic projections of the growth in demand for UHT milk. As other reports have pointed out, it is surprising how so many UHT milk plants could have been financed by both domestic and international lending agencies without adequate market analysis. It is even more surprising that the government was unable to monitor these developments and allowed development finance institutions to, in effect, make dairy policy for the country. The result of this spectacular, and largely unplanned, growth in UHT milk processing capacity is that most plants are operating at such low levels of capacity that they are unable to meet their fixed and variable costs. The situation is expected to deteriorate as the additional capacity currently being constructed comes on line.

Much of the overinvestment in UHT capacity occurred because of liberal lending policies of government owned banks. The availability of debt finance together with the possibility of overinvoicing imported machinery meant that little equity was required for investment in new capacity. As a result, entrepreneurs exhibited less caution in setting up new projects than they would have if more of their capital was at risk. At the same time, bank lending to this sector was largely uncoordinated with the result that each financial institution sanctioned loans oblivious of what others were doing.

2.7.2 *High Packaging Cost*

A major factor inhibiting the growth of the market for UHT milk as we have seen earlier is its high price relative to competing products. One of the main reasons for this is high packaging cost which accounts for nearly 24 percent of the retail price of the product. While this high packaging cost is to some extent inevitable, given UHT processing technology, it is also due in part to government taxes on packaging materials. Taxes and duties on the import of intermediate materials used in the manufacture of packaging material range between 20-120 percent while a sales tax of 12.5 percent is levied on the sale of packaging material to the dairy industry. Altogether, these various taxes and duties are estimated to add approximately Rs. 0.50 per litre to packaging and hence UHT milk processing costs.

Another problem is the alleged poor quality of domestically produced packaging material which by contributing to high processing costs, storage and marketing losses, increases costs

per litre of milk sold. Many plants indicated that they were experiencing packaging material losses during processing and storage of between 3-4 percent while market returns due to package failures outside the plant averaged over 3 percent. Given the extremely narrow processing margin estimated in Section 5.6 above, few milk plants can expect to operate profitably at these levels of efficiency. The UHT milk production cost analysis suggests that even a 1 percent increase in market returns over 3 percent would result in a negative processing margin.

At the same time the existing duty structure on imported packaging material has virtually created a monopoly for Tetra Pak Pakistan Limited, the sole domestic supplier of paperboard carton packaging material. Duties and taxes amounting to nearly 120 percent on the import of finished paperboard cartons are prohibitive for plants contemplating the purchase of alternative packaging systems based on imported paperboard cartons.

Because of the high cost and alleged problems with the quality of available packaging materials, a number of new plants appear to have opted for plastic sachet packaging. Although reported to be almost Rs. 1 per litre cheaper than paperboard cartons, the acceptability of this type of packaging in the marketplace is as yet unproven. For most plants, however, who have already invested in expensive paperboard carton packaging equipment, there appear to be few options available, at least until the initial capital costs of the equipment are written off.

2.7.3 *Competition From Raw Milk*

Most consumers in Pakistan continue to purchase raw milk which is considerably cheaper in comparison with UHT processed milk. There is a widespread perception that this is because they prefer the taste of the "high fat" raw milk over UHT milk. However, in the absence of controlled consumer tests, it is not readily apparent that what is being demonstrated is a "taste preference" rather than a "price preference" for the cheaper product. In any case, because of consumer acceptance of the cheaper, but often diluted and unhygienic, raw milk, it is extremely difficult for the UHT milk industry to compete with the former. This situation is unlikely to change radically unless the government establishes and enforces milk composition and hygiene quality standards.

2.7.4 *Competition from Whole Milk Powder*

As a "convenience" product, UHT processed milk competes most directly with imported whole milk powder (WMP). Competition is particularly strong in Karachi where WMP has since long established a market niche for itself partly due to the inability of raw milk supplies to keep pace with the city's rapidly growing population. Whole milk powder is imported in tins and in bulk (25 kg bags), though the latter is subsequently repackaged by retailers in 1 and 1/2 kg polyethylene bags prior to sale. Although tinned milk is mainly consumed by upper income groups, that available in polyethylene bags is bought largely by lower and middle income groups.

The dairy industry claims, with some justification, that the present level of import duty on WMP (enhanced this year to Rs.10/kg) does not provide adequate protection from subsidized imports. This is particularly true of the WMP imported in bulk whose retail price, when repackaged, is still considerably below that of UHT milk. WMP imports over the last three years have averaged about 16,500 metric tons or 125 million litres in liquid milk equivalent terms annually. This is 45 percent more than the total UHT milk sold in the country or the equivalent of the production from eight new UHT plants.

2.7.5 *Import Duties on Skim Milk Powder*

While custom duties and taxes on milk powder have not been able to protect the dairy industry from competition from WMP, they have raised UHT milk processing costs. This is because these taxes are also levied on skimmed milk powder (SMP) which is used as an input by UHT milk plants. Import duties and taxes account for nearly 50 percent of the landed cost of SMP and at current prices represent approximately Rs. 0.35 per litre of total UHT milk processing costs. However, a word of caution needs to be introduced here. While low SMP prices are clearly in the interest of the UHT milk industry, as indeed of other users, they are inimical to the development of a domestic milk powder manufacturing capability.

2.7.6 *Unrealistic Milk Standard*

According to the Pure Food Laws established by the government, the solids not fat (SNF) content of 'standardized' milk should be at least 8.9 percent. Since the average SNF level of raw milk procured by milk plants ranges between 6-8 percent, they have to add costly SMP to raise the SNF content to the level prescribed. The current milk standard seems to be excessive as most cattle milk produced in the country does not contain this level of SNF. This is increasingly likely to be the case as more cross breeding is introduced. A lowering of the SNF standard from 8.9 to 8.5 percent would not only make it more realistic but would reduce UHT milk processing costs by Rs. 0.15-0.20 per litre.

2.7.7 *Poor Product Image*

Generally, UHT milk has a very poor product image and lacks credibility in the eyes of the public as a quality product. This is partly due to a lack of understanding of the role of SMP addition in UHT milk processing. It also stems, in part, from negative publicity generated as a result of advertising campaigns mounted by competitors. One campaign in the form of leaflets distributed to households, for example, warned parents not to give UHT milk to their children because it claimed that the nutrients in the milk had been destroyed by the high heat treatment. In these circumstances, it is surprising that the industry has done little collectively to promote its product or educate consumers. While some individual UHT milk processors advertise their product, most do not spend much on promotional activities which is in sharp contrast to the expensive advertising campaigns of foreign powder milk manufacturers.

2.7.8 *Lack of Product Diversification*

In contrast to the raw milk market which offers a range of milk products with respect to price, quality, fat content etc, UHT milk plants offer a single, uniform product standardized at 3.5% fat and 8.9% SNF. It is extremely unlikely that this product meets the requirements of all market segments and the lack of choice for consumers must surely limit potential UHT milk sales.

In addition, few UHT milk processors have managed to diversify production to include other products such as butter, cheese, cream, yoghurt, ice cream or fruit juices. To be fair, the scope for product diversification appears to be somewhat limited at present as the market for many of these products is either small or already saturated. A government ban on the export of dairy products prevents processors from tapping potential export markets and acts as a further disincentive to product diversification.

2.7.9 *Raw Milk Procurement*

The acquiring of raw milk has not yet constituted a serious problem for most UHT milk processing plants. In fact, during the winter flush raw milk production season, plants often refuse to buy all the milk offered for sale due to their inability to market the extra quantity. However, the situation is completely reversed in the summer when, due to low milk production, it becomes difficult to procure adequate quantities of raw milk. Apart from the issue of quantity, the quality of raw milk also deteriorates during summer and plants require a larger input of SMP to raise SNF levels.

Milk processing plants have traditionally resolved their raw milk procurement problems during summer by resorting to rather liberal use of SMP in order to enhance production volumes. However, this option has become increasingly unattractive due to rising SMP prices. As more UHT plants become operational, competition for raw milk supplies is likely to intensify. This will tend to raise milk collection costs and further squeeze processing margins.

2.8 Seasonality and Powder Milk Production

As discussed in Chapter 4, Pakistan's dairy sector is characterized by seasonal imbalances in the supply and demand for milk. Consumption of milk and other dairy products is highest during summer when raw milk production is lowest. The resulting shortage is met largely by milk powder imports, part of which are used by both milk plants as well as urban milk producers and dodhis to expand the volume of milk supply in the summer months. In contrast, there is generally oversupply during winter when the market is unable to absorb the entire milk production, a part of which is converted into desi ghee and butter.

UHT milk plants offer only limited possibilities for stretching milk supplies to meet peak summer demand because of the large storage and financing requirements this would involve as well as the relatively short shelf life of its product. Milk powder production, therefore,

represents the principal means by which Pakistan can overcome the present seasonal imbalances between milk production and consumption. By conserving milk from the flush winter season for use later during the year, milk powder manufacture would not only contribute towards solving the seasonality problem but would also substitute imports and thereby save foreign exchange. Milk powder imports have averaged nearly 25,000 tonnes valued at Rs. 410 million annually over the past five years.

Until recently, domestic milk powder production has not been a commercially viable proposition because of the availability of subsidized milk powder imports, much of it arriving as food aid from the EEC. As a consequence, production from two milk powder plants has catered almost exclusively to the needs of the army with little being sold on the open market. With the imposition of higher import duties on milk powder this year and the upturn in international prices due to the reduction in subsidies by the EEC and USA, conditions now appear to be relatively more favorable for investment in milk powder manufacturing. This is reflected in a proposed joint venture between a large domestic UHT milk producer and a renowned multinational to manufacture milk powder and infant milk foods in the near future.

In theory, milk powder production is important because of its potentially large impact on producer incentives. Milk powder plants could be set up either as independent units or more likely as extensions of existing UHT milk processing plants. While the feasibility in each case needs to be examined in detail by experts, it would appear that certain advantages would accrue if these are attached to UHT milk plants. First, investment costs would be lower since much of the infrastructure required would already exist. Second, by enabling processors to establish links with more producers during the flush production period, milk powder manufacture would also help to increase raw milk collection during the summer season.

2.9 Pasteurization

UHT is an inherently expensive process. Even if all the various taxes and regulations affecting the cost of UHT milk are removed, it will remain a relatively high priced product beyond the reach of most consumers. Therefore, in order to promote the consumption of hygienic and quality milk among a larger segment of its population, Pakistan will probably have to look towards alternative technologies, particularly pasteurization.

Pasteurization has its disadvantages, the principal one being the short shelf life of the product. As a result, refrigeration facilities are required for its distribution and even then the milk has to be sold within 24 hours of its processing. While this is a necessary requirement in Pakistan, it may be noted that with higher sanitation standards at all levels and reliable high quality household refrigerators, pasteurized milk is allowed to be sold in the United States as long as 14 days after processing.

On the other hand there are a number of advantages of pasteurization. First, processing and particularly packaging costs are low. A 1974 FAO study, though admittedly dated, estimated that packaging and distribution costs for pasteurized milk, depending upon the

system chosen, were 25-60% lower than for UHT milk. The Lahore Milk Plant, which produces small quantities of pasteurized milk in polythene bags reported packaging costs of Rs. 0.30 per litre compared with Rs. 1.80 per litre for UHT milk.

Unlike UHT technology, pasteurization also offers a greater choice with respect to the type of packaging and distribution system which can be used. The range includes bulk vending machines, glass and plastic bottles, plastic sachets and paperboard cartons. This provides processors flexibility to choose systems appropriate for different market segments. The second advantage is that pasteurized milk closely resembles raw or fresh milk as there is no cooked flavour. Therefore, it is likely to be more acceptable to consumers used to the taste of fresh milk. Finally, because pasteurization units can be smaller in scale, they offer greater possibilities for integrating processing with milk production. The latter is important from the perspective of reducing the costs associated with the traditional distribution system's long marketing chain as well as improving producer incentives.

Pakistan's earlier experience with pasteurization plants in the 1960s and 1970s is generally regarded as a failure. However, this appears to have been due mainly to its public sector orientation, the emphasis on "recombined" milk, poor management, and inadequate marketing. There are good reasons to believe that conditions are now more favorable for pasteurization. For one, the marketing infrastructure is more developed than it was in the 1960s. Chilled distribution facilities exist for ice cream, yoghurt and soft drinks and there is a sizeable domestic refrigeration industry. Secondly, the modern dairy sector has more experience in raw milk collection from rural areas which was lacking previously. Since other countries with much less developed marketing infrastructures have successfully demonstrated the viability of pasteurized milk production in tropical conditions, there is no reason why it cannot succeed in Pakistan. Due to lower cost, pasteurized milk can be used in ice cream, yogurt and industrial baking etc.

Indeed, there are already signs of renewed interest in pasteurization in the country. A small plant is being established as part of the Pattoki Livestock Production Project and a private operator has reportedly leased the Karachi Milk Plant from the government with the intention to produce pasteurized milk. A few large commercial dairy farmers are also in the process of establishing "mini" pasteurization units as extensions to their dairy enterprises.

The government may want to consider using the public sector plants at Karachi and Lahore as pilot projects either by leasing them to private operators (as they have apparently done in one case) or disinvesting in them totally. The possibility of providing pasteurization facilities to the well organized peri- urban producers of the cattle colonies at Karachi and Lahore also needs to be examined. While pasteurization may, in theory, be better suited to Pakistan conditions now, government policy should be to let the market develop at its own pace rather than forcing the development towards one form of processing or another.

2.10 Conclusions

Pakistan's modern dairy sector is relatively small. Less than 3 percent of the total milk produced and 7 percent of that marketed is processed by 21 large dairy plants operating

in the country. In terms of both size and investment, the dairy industry is dominated by UHT milk plants which account for nearly 80 percent of the total raw milk processed. However, because of inadequate demand, most UHT plants are operating below their breakeven capacity. Inspite of this, UHT capacity will more than double by 1989 as 15 additional plants become operational. These plants appear to have been sanctioned without any reference to market demand and it is extremely doubtful that many of them will survive the competition for market shares.

At present, the growth in demand for UHT milk is constrained by its high price relative to that of competing products such as raw milk and whole cream milk powder. While government taxes and regulations contribute to the high processing cost of UHT milk, even if these are removed it will remain a high priced product beyond the reach of most consumers. This is not to imply that UHT technology is inappropriate for Pakistan. Clearly it has a role to play, particularly in addressing the spatial shortages of milk which exist in the country. UHT milk will continue to be an important source of supply for distant milk deficit areas where the marketing infrastructure is poor. It will also have a market among upper income groups and others willing to pay the higher price for the convenience of its long shelf life without refrigeration. But its potential market is limited and growth in demand even over the next ten years is likely to be insufficient to accommodate the capacity currently being installed.

Because of the limited market potential of UHT milk, Pakistan will have to consider alternative processing technologies if it wants to promote the consumption of unadulterated processed milk among its population. Pasteurized milk, because of its low processing and packaging costs, could compete more effectively with unprocessed milk and the future development of the dairy industry may well lie in this direction. Recommendations on policy measures and industry actions deemed necessary to make the milk processing sub sector viable are presented in Chapter 5.

3. ADMINISTRATIVE AND REGULATORY STRUCTURE

3.1 Regulation and Taxation of the Dairy Industry

The Pakistan dairy industry has existed in a fairly intervention free atmosphere. However, some of the animal conservation laws and price controls on livestock products indirectly affect the dairy industry. This section gives an overview of the different regulations that affect the dairy industry. A brief account of the import duties, sales taxes, and restrictions that affect dairy industry development is also provided.

3.1.1 *Pure Food Regulations*

The 1965 Pure Food Rules which were conferred by the Pure Food Ordinance in 1960 superseded all earlier pure food regulations in the country. These rules specify that cow and buffalo milk is not to contain less than 3.5 and 5.0 percent butter fat (BF) and 8.5 and 9.0 percent solids not fat (SNF) respectively. Standardized milk is to contain 3.5 percent BF and 8.9 percent SNF. However, there is no federal agency that enforces these standards. Urban area municipal authorities occasionally undertake spot checks of milk brought to the city for BF contents only.

The dairy industry maintains that the SNF level specified for UHT milk is unreasonable. During processing when the milk fat is lowered to 3.5 percent, it becomes essential to increase the SNF by adding skim milk powder. This raises the already high production costs which make the product comparably more expensive to other milk i.e. raw and dry milk.

3.1.2 *Conservation of Animal Acts*

The animal conservation laws in the provinces of Punjab, Sind and NWFP specify Tuesdays and Wednesdays to be meatless days. The applicable laws governing this legislation include Punjab Conservation of Cattle (Meatless Days) Act, 1954; West Pakistan Conservation of Useful Animals Act, 1954; and The Sind Cattle And Fodder Control Act, 1947. Beside meatless days, there are price ceilings on the sale of beef and mutton. Such restrictions, it is believed, discourage quality meat production and are not only a disincentive to meat producers but also adversely affect the cost of milk production especially for the peri-urban producers in Karachi area for whom the sale of culled cattle is a major portion of their gross returns.

3.1.3 *Import Duties and Sales Taxes*

Milk processing plants qualify for a number of incentives including the duty free import of

dairy equipment and machinery, whereas the indigenous dairy equipment manufacturers are not recognized by the government as part of the dairy industry. Therefore, they are not exempt from the high import taxes imposed on raw materials which, in case of stainless steel, amounts to Rs. 16,000/tonne. There are different sets of import duties on raw material for packaging as given in Table 3.1 below.

Table 3.1 Duties and Taxes on Dairy Product Imports

Item	Import duty	Sales Tax	Other Taxes
PPP Strips	120%	12.5%	10%
Aluminum Foil	80%	12.5%	10%
LD Polyethylene	Rs 13/Kg	-	10%
Paper Board	Rs 4/Kg	12.5%	10%
Pulp (used for local paper board)	20%	-	10%

Source: Pakistan Dairy Association

As discussed in Chapter 2, the packaging cost for UHT milk is approximately 25% of the total cost and industry estimates indicate an effective reduction of Rs 0.50 per litre in the sale price of milk if the above duties and taxes are taken away. There are no restrictions on the import of powder milk except for some licensing requirements for the importers in the private sector. Public sector imports under various commodity assistance programs such as WFP, PL 480 and concessional sales by EEC, have considerably been reduced as all public sector processing plants (except the one at Lahore) have already been leased out to the private sector. Cost breakdown of imported skim milk powder is shown in Table 3.2.

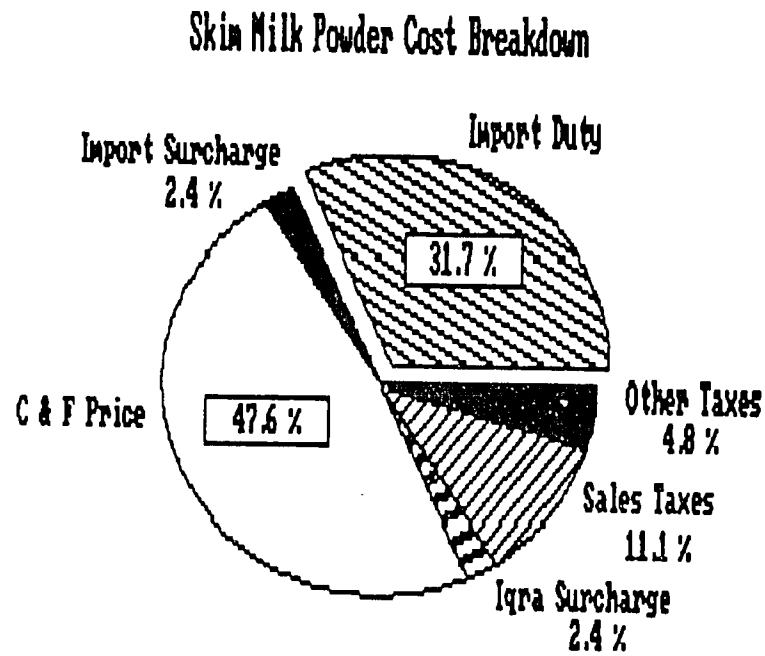
Table 3.2 Cost Breakdown of Imported Skim Milk Powder

Cost Item	Rs./Kg
C & F Price	15.00
Import Duty	10.00
Import Surcharge (5 %)	.75
Iqra Surcharge (5 %)	.75
Sales Taxes (12.5 %)	3.50
Other Charges	1.50
Landed Cost	31.50
Market Price	38.00
Taxes as % of Landed Cost	48 %
Taxes as % of Market Price	40 %

Source: International Consulting Division, Chemonics.

Figure 3.1 presents the breakdown of the landed cost of skim milk powder. There is a flat import duty of Rs. 10/Kg on skim milk powder which was raised from Rs. 5/Kg in July, 1987. The duty and Iqra surcharge as well as the sales taxes which are levied on the C & F price amount to 48 percent of the landed cost and 40 percent of the market price. This adds to the burden on the processing sector which uses SMP to increase SNF content of the standardized milk. On the other hand, the present duty structure is also a necessary step to support the indigenous industry and counter the heavily subsidized dairy exports of EEC and other countries. All the dairy products produced locally, beside ice cream, are exempt from all sales and excise taxes.

Figure 3.1



On the other hand, there is a total ban on the export of dairy products in Pakistan. This ban does not allow the dairy processing sector to benefit from the comparative advantage it may have.

3.2 Institutional Set-up and Regulatory Process

Agriculture is constitutionally a provincial subject in Pakistan. However, the provincial governments operate within an overall policy framework for agriculture in consultation with the federal government. The organization of livestock services thus differs from one province to another. A general description is provided below:

The Federal Ministry of Food, Agriculture and Cooperatives (MINFAC) is responsible to provide a national perspective to the provincial agricultural development effort. The federal minister is assisted by secretaries, in charge of various divisions, and by the ministry's technical staff. The livestock division of MINFAC deals mainly with administrative, establishment and technical matters. The animal husbandry commissioner/joint secretary is assisted by two deputies, one concerned with disease, the other with milk and meat. There are assistant animal husbandry commissioners dealing with, a) drugs and vaccines, b) poultry, c) nutrition, and d) milk and meat, and research officers for planning and statistics.

The provincial Departments of Agriculture implement the livestock development programs in the provinces. The provincial ministers of agriculture are responsible to the provincial

chief ministers and are assisted by the provincial secretaries and their technical staff.

The Punjab province has by far the largest number of professional staff (85 percent of the national total) working with livestock affairs. The Department of Livestock and Dairy Development is separate from the Department of agriculture in the province of Punjab. Research and extension is organized under the Directorates of extension, livestock production, extension, and artificial insemination (AI). These directorates have divisional and district level offices. Punjab is the only province to have a planning and evaluation unit within its livestock department.

The Animal Husbandry Department in Sind is responsible for all livestock activities in the province. The treatment and control of contagious and parasitic diseases of livestock and the improvement of local breeds to increase the production of milk and meat are the two major functions of the department. Much of the work is organized on a project basis. There are projects for livestock production, extension and AI services. The large scale Sind Livestock Development Project has been launched recently with the assistance of Asian Development Bank.

The Livestock and Dairy Development Department in NWFP is headed by the Director who is assisted by a Deputy Director and district-level Assistant Directors. A Project Director is in charge of AI activities while a Deputy Director supervises poultry production and the dairy farm at Harichand. Livestock research has been incorporated into Agricultural University structure and the department does not have a research unit.

The livestock department in Baluchistan is headed by a Director General who is supported by a Director for research, and project directors for the Baluchistan Livestock Development Project (BLDP). The director of research is responsible for dairy farms and beef and sheep research station. Vaccine production is supervised by the project director of the BLDP.

3.3 Livestock Training, Research and Extension

Livestock training, short term and applied research and extension is provincially controlled, while the federal government is responsible for more basic, long-term research. Responsibility for agricultural research on a national basis is divided among several ministries and semi-autonomous institutions. The three agricultural universities and about 60 research and academic institutions scattered throughout Pakistan generally work in isolation, with little cooperation among themselves. The Pakistan Agricultural Research Council (PARC) is responsible for coordinating agricultural research and keeping it in line with the country's economic and social development policies.

Within the framework of such national coordination, most research is initiated and conducted by provincial institutes. Most important among these are the Livestock Production Research Institute (LPRI) at Bahadurnagar, the Veterinary Research Institute (VRI) at Lahore, the Artificial Insemination Center (AIC) at Qadirabad, and the Dairy Technology Institute at Rakh Bhunike. All of these are agencies of the Punjab Livestock and Dairy Development Department. The Sind Animal Husbandry Department is also

planning to set-up a Livestock Production Research Institute similar to the one at Bahadarnagar in Punjab.

The agricultural universities at Faisalabad, Tandojam and Peshawar offer degree courses in animal husbandry and veterinary medicine, providing technical support required by the livestock industry. Altogether, the annual output of graduates from these institutions is about 150-200 in veterinary medicine, 40-50 in animal husbandry and 70- 80 with joint degrees. Other institutes in Punjab, NWFP and Sind train about 40 livestock assistants annually. Whereas, about 35 para-veterinarians annually receive training from the para-veterinary training institute at Quetta.

Each province provides livestock extension services to farmers. However, practically all the staff members are veterinarians mainly capable of extending veterinary services, primarily vaccinations and inoculations against contagious diseases. They have limited training and experience to offer information regarding the use of improved animal husbandry procedures and improved fodder crop production methods etc.

3.4 Dairy Policy Objectives

The broad national objectives of livestock and dairy development are: a) to achieve self-sufficiency in milk and meat production; b) to achieve stability of the resource base for sustainable development of livestock production; c) to meet the requirement of consumers, particularly the growing urban population, for meat and milk of good quality at an affordable price; d) to promote an improvement in the welfare of people who are dependent on livestock for their living and income, with particular concern for the landless and small farmers including farmers in remote and difficult areas, and rural women.

These objectives are reflected in some of the government programs and policies. The private sector is encouraged in the production, processing and marketing of milk. Milk processing plants qualify for a number of incentives which include duty free import of machinery and equipment. Government also provides support for the improvement of feed production and stock improvement, by allowing duty free import of semen of exotic breeds, encouraging artificial insemination, and embryo transplants. Other incentives include the support for research at the institutional level, credit programs available through Agriculture Development Bank of Pakistan (ADBP) and other financial institutions, extension and training, meatless days and price controls on sale of meat and restrictions on dairy exports.

3.5 Dairy Policy Making Process

Dairy policy formulation in Pakistan constitutes a complex process. Figure 3.2 schematically illustrates this process which was developed through personal interviews with government officials, dairy experts and industry officials. There are several agencies and ministries involved in policy formulation whose feedback is necessary to have a consensus towards a national policy. The important ministries and agencies important to the dairy policy making process are highlighted below.

3.5.1 *Ministry of Food, Agriculture and Cooperatives*

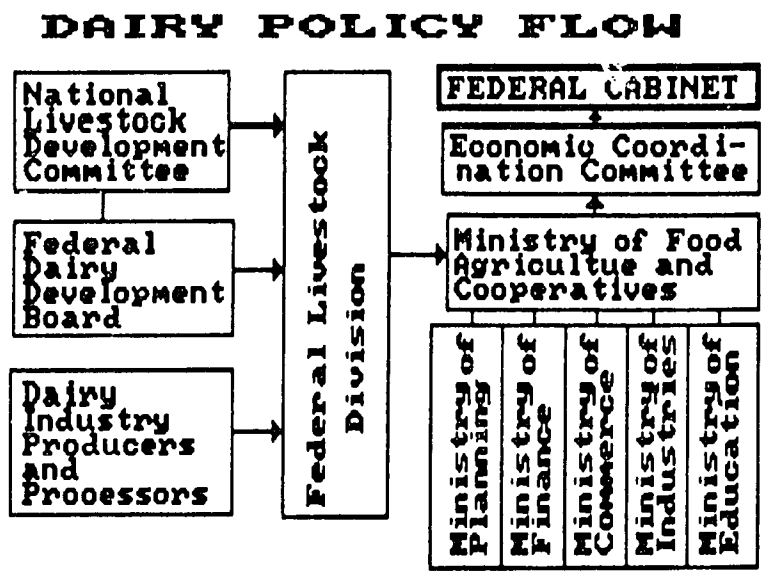
The Ministry of Food, Agriculture and Cooperatives (MINFAC) through its Livestock Division, is clearly the central pivot in the policy making process. Its minister chairs both the National Livestock Development Committee and Federal Dairy Development Board. It serves as the main conduit through which all the information regarding policy recommendations is directed to other ministries. After consensus is reached among all the ministries concerned, MINFAC presents these to the Economic Coordination Committee of the cabinet for approval and then to the concerned agencies for implementation.

3.5.2 *National Livestock Development Committee*

The National Livestock Development Committee was established in 1975 as a committee to draw up and recommend national action programs concerning a) imports and exports of livestock and birds; b) export of manufactured livestock feed surplus to local requirements; c) import of machinery, equipment, life saving drugs, micro-ingredients, chemicals for livestock and poultry development; d) allocation of milk powder, feed grains, etc. received under various aid programs; and e) provision of necessary incentives for livestock and poultry development and any other matters referred to it regarding livestock and poultry.

The committee is chaired by the minister of MINFAC and several ministries and agencies are represented on it to ensure equitable feedback pertaining to their individual scopes of responsibilities. The committee remained the principal policy initiator for dairy until the late 70s when separate dairy and poultry boards were constituted. The committee then remained inactive until it met in early 1987 after a break of 8 years.It was then directed by the chairman to meet at least on a yearly basis. Annex A describes the composition of the committee.

Figure 3.2



3.5.3 *Federal Dairy Development Board*

The Federal Dairy Development Board has remained the principal policy architect for the dairy sector since its establishment in 1979.The board, on which all the concerned agencies and ministries are represented, has served as a forum for discussing dairy policy and making recommendations to the government.

Its scope of work includes matters relating to: (a) production, importation and pricing of milk and milk products, (b) training needs and applied research requirements of dairy industry, (c) trade policy on dairy products, (d) dairy machinery and spare parts, (e) import and export policies required for expansion of the dairy industry, (f) legislation required for the dairy industry, (g) future development of dairy industry and any other matter which may be referred to the board regarding dairy development. Annex B shows the list of members of the board. The board has met only a few times since its inception.

3.5.4 *Livestock Division*

The Livestock Division, as part of MINFAC, is headed by a Joint Secretary/Animal Husbandry Commissioner and deals mainly with administrative, establishment and technical matters. Over the years, livestock division has evolved into the main coordinating body between the federal and provincial governments for the implementation of dairy policies and between the dairy industry and the government. Any donor agency interested in establishing a livestock project in Pakistan has to channel its assistance through the Livestock Division.

3.5.5 *Dairy Industry*

The Dairy industry, consisting of milk producers and processors, is represented on the Federal Dairy Development Board. Pakistan Dairy Association is the major spokesman for the dairy industry which provides the necessary feedback to the Livestock Division regarding the state of the industry, its problems, and suggesting desired policy changes. The recommendations consist of a host of items concerning duties, taxes, exemptions, restrictions on imports etc. Sometimes the interests of the processors do not lead to a simple consensus position. For example, there is a constant pressure to increase the import duties on milk powder to protect the indigenous industry but, in turn, the processing industry also uses imported skim milk powder to increase the solids not fat (SNF) content of milk to the prescribed level.

3.5.6 *Other Ministries*

Ministry of Industries is relatively more concerned with the dairy processing sector and has regulatory powers with regard to the dairy processing plants for their establishment and location. Ministry of Finance looks at the budgetary constraints, Ministry of Commerce suggests the tariffs and sales taxes etc. Similarly, Ministry of Planning is responsible for fitting the recommendations within the broader framework of issues. Hence, each one of them plays an important role towards the formulation of policy regarding the dairy industry.

3.6 Conclusions

Inspite of the importance of dairy industry to the national economy, it has not received sufficient support and attention from the government. There are some principal constraints encountered by the research, training, and extension programs. Research is being conducted by Agricultural Universities and autonomous and semi-autonomous agencies with no meaningful coordination between them. Extension services are inadequate, with principal emphasis on providing veterinary services. They have limited capabilities to offer advice on better feed and animal production technology to the producers. Agricultural Universities and regional technical institutes lack an adequate cadre of experienced professionals in dairy husbandry or processing technology to provide necessary training in these disciplines.

The policy making structure in Pakistan is highly complex and dispersed with a number of ministries and agencies involved. The principal role lies with MINFAC receiving feedback from different committees and agencies i.e. National Livestock Development Committee (NLDC), Federal Dairy Development Board (FDDB), Livestock Division and dairy industry groups. Although the policy making hierarchy is well defined, some limitations are apparent at the various levels. NLDC remained inactive for an extended period of time and FDDB met only a few times, slowing the formal policy making process and restricting its capability to review and recommend further action in view of the changes occurring in the dairy industry. Livestock Division provides the much needed coordination between the agencies and MINFAC, but lacks experts dealing with livestock planning, statistics and analysis.

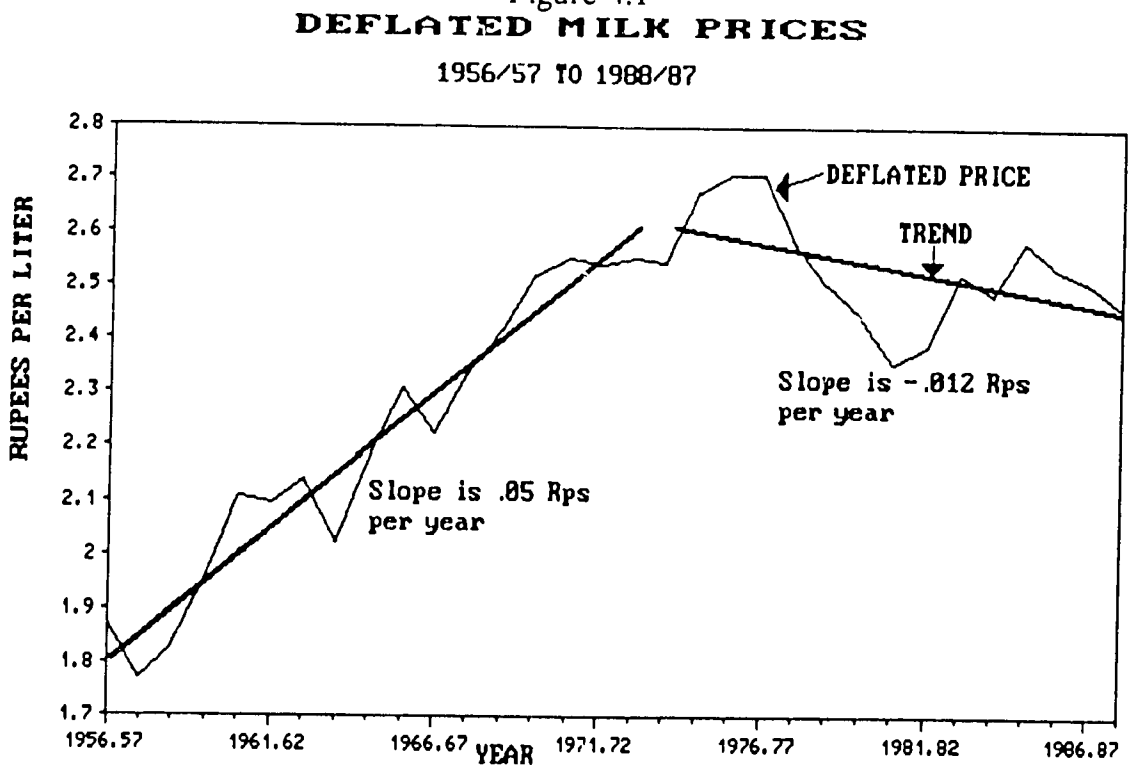
4. MILK PRICE, DEMAND AND SUPPLY

4.1 Long Term Price Trends for Milk, Beef and Desi Ghee

The three major products of dairy buffaloes and cows are milk, beef and desi ghee. The nominal price trends of all these three products show regular year to year gains. Nominal price increases from the mid fifties to the mid seventies appear to be slower than those experienced after the mid seventies to date. These price increases are misleading because during the last ten years they have not been as rapid as inflation. Deflated prices of milk, beef and desi ghee have been stable or slightly declining over the last ten years. This is not conducive to growth in the production of milk since productivity has not increased to offset the flat or falling relative prices and real profits in the dairy industry are likely declining.

The flat to downward trend in deflated milk prices, as shown in Figure 4.1, is of particular concern because milk is a major food in both rural and urban diets. As the deflated prices decline, producers are discouraged from building herds and herd size necessary to sustain milk production. Reduced livestock numbers cannot be easily regained. The production cycle is extensive for buffalo, requiring five or more years to rebuild herds if they have been sold off due to non profitability. In this case, dairy producers will keep cows until they no longer reproduce and lactate on a regular basis; then, they will sell and not replace them.

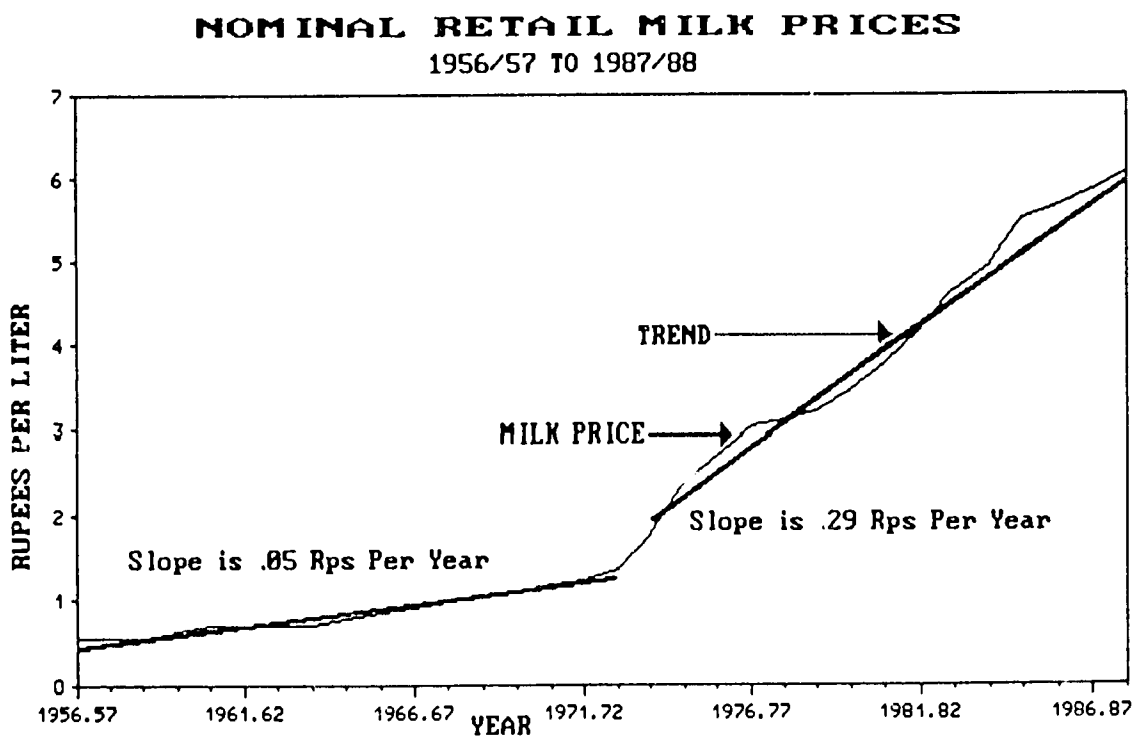
Figure 4.1



They often regard capital invested in livestock as sunk capital and will hold animals until they are spent, realizing that they can get a substantial part of the value of the animal back from slaughter or meat value. After buffalo and cattle numbers decline and milk production recedes it is necessary for prices to rise for a number of years before producers are willing to start the herd rebuilding process. This is the normal buffalo and cattle cycle that evolves in most countries. However, due to the method of estimating livestock numbers, the actual cycle is not observed in Pakistan.

Nominal prices of milk as shown in Figure 4.2 are increasing at about 10% per year but as noted earlier this has not been fast enough to keep up with inflation in the last 10 years. Milk prices are relatively free except for some interference from milk market committees. Attempts at controlling milk prices at this point could be destructive since farmers would be further discouraged from building herds. In addition, some livestock will be purchased and exported to Afghanistan and Iran as both countries rebuild their agricultural economies.

Figure 4.2



Ghee prices have followed a pattern similar to milk prices (Figure 4.3 & 4.4). However, ghee prices are affected by edible vegetable oil prices. Edible vegetable oils are replacing ghee in the diet. Not surprisingly, ghee prices have not increased rapidly because low priced vegetable oil has largely replaced ghee. As noted earlier, the reduction in ghee making has made larger amounts of fresh milk available. The making of one kilo of ghee requires from 18 to 24 kilograms of fresh milk.

Figure 4.3

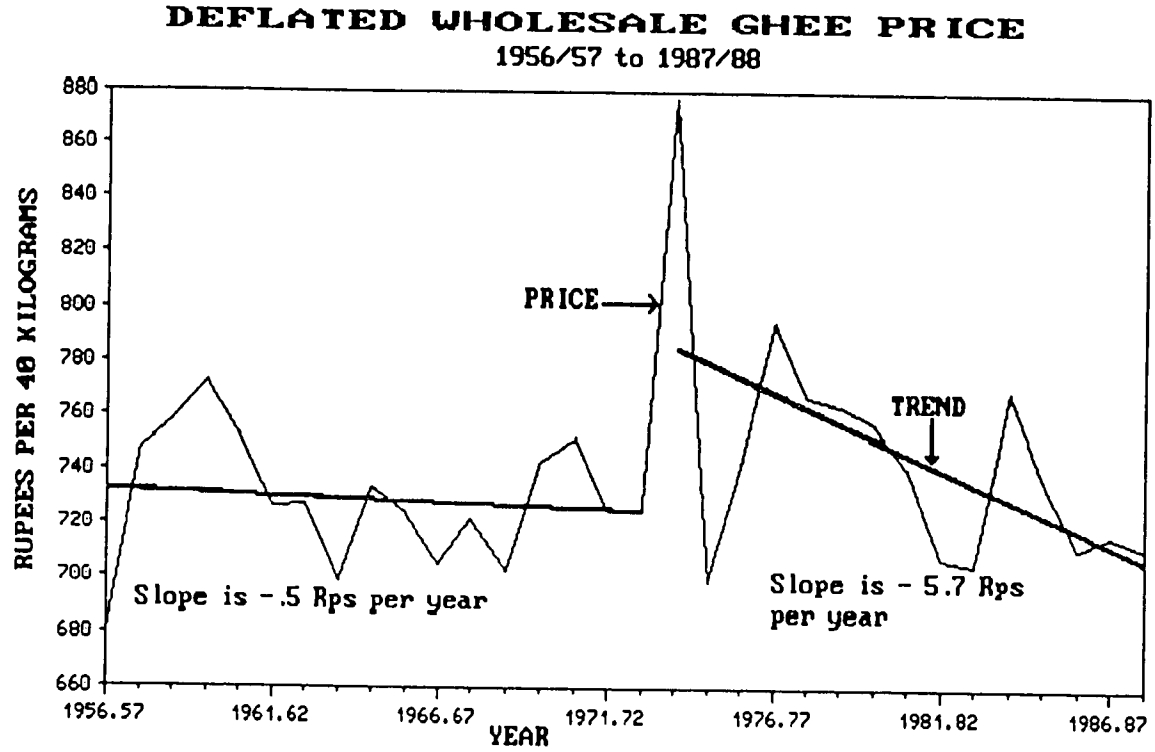
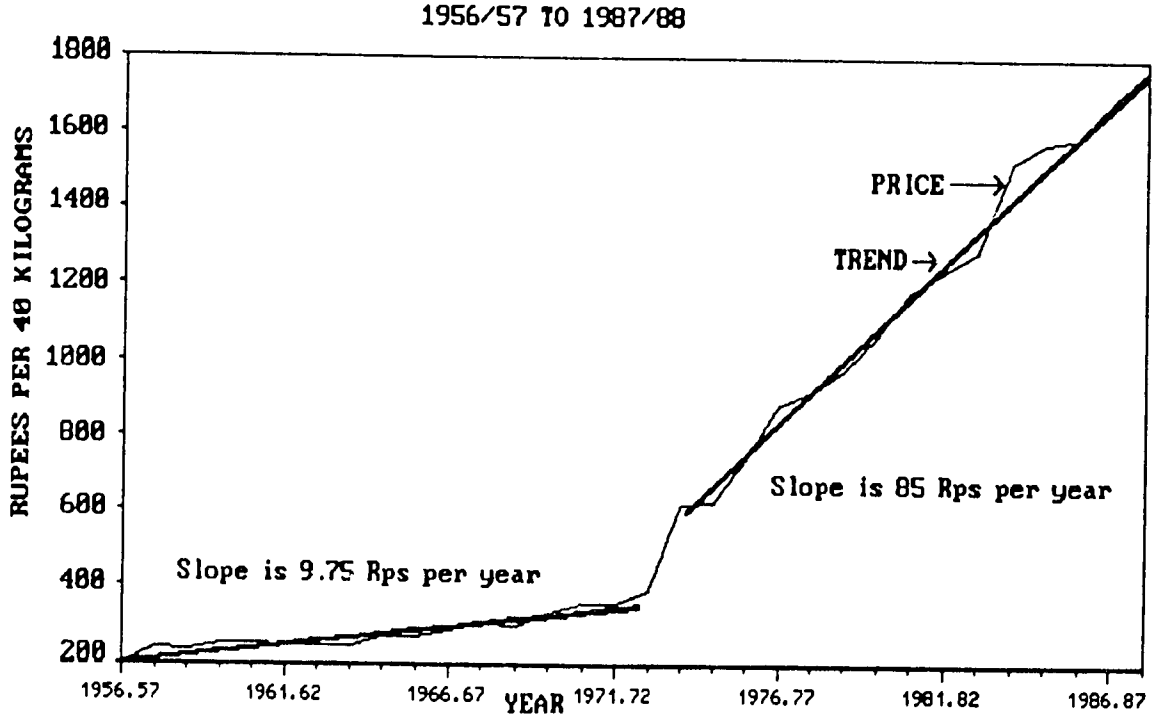


Figure 4.4



Ghee price increases have been minimized through the effects of price controls on edible oils. However, since 1986, vegetable oil prices have been decontrolled and ghee prices may both rise and fall as edible vegetable oil prices vary in response to market forces. With the new variance in edible vegetable oil prices, ghee could become more competitive. Since ghee making is largely a cottage industry, new production could be started without significant new investment.

Yogurt is also an important product made from milk. Yogurt prices are not shown here since they for the most part follow the same trends as fresh milk prices. To some extent yogurt has a longer storage life than fresh milk.

Beef is an important revenue source of the dairy farm. The dairy buffalo produces a calf, roughly, every one and a half to two years. The calving interval for Pakistan milk buffalo is varied because there is no regular reproductive rhythm. The gestation period is around 10 months and the first estrus period follows, under the best of conditions, in 3 or 4 months. Besides calves the spent animal is sold for slaughter meat which returns the capital that is often used to purchase a replacement. In Karachi area, it is reportedly a common practice for dairymen to purchase lactating animals which are sold for slaughter when they go dry.

The price of beef has increased more rapidly than either milk or ghee and has for the most part exceeded inflation (Figure 4.5 & 4.6). Based on earlier reports, developed on the Pakistan poultry industry, beef prices have been importantly affected by rising incomes and

Figure 4.5

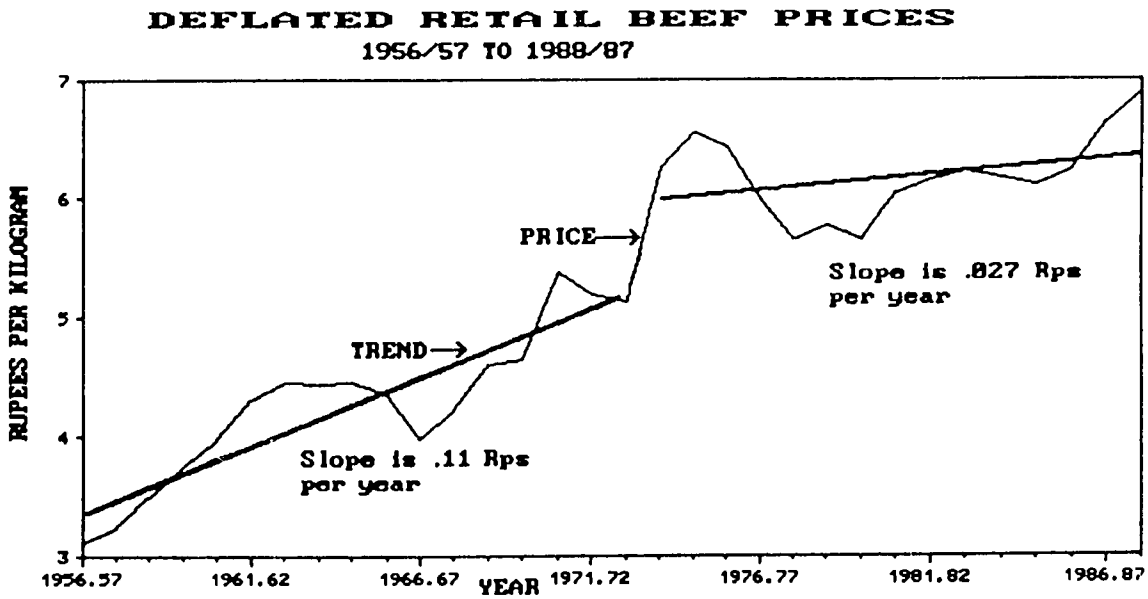
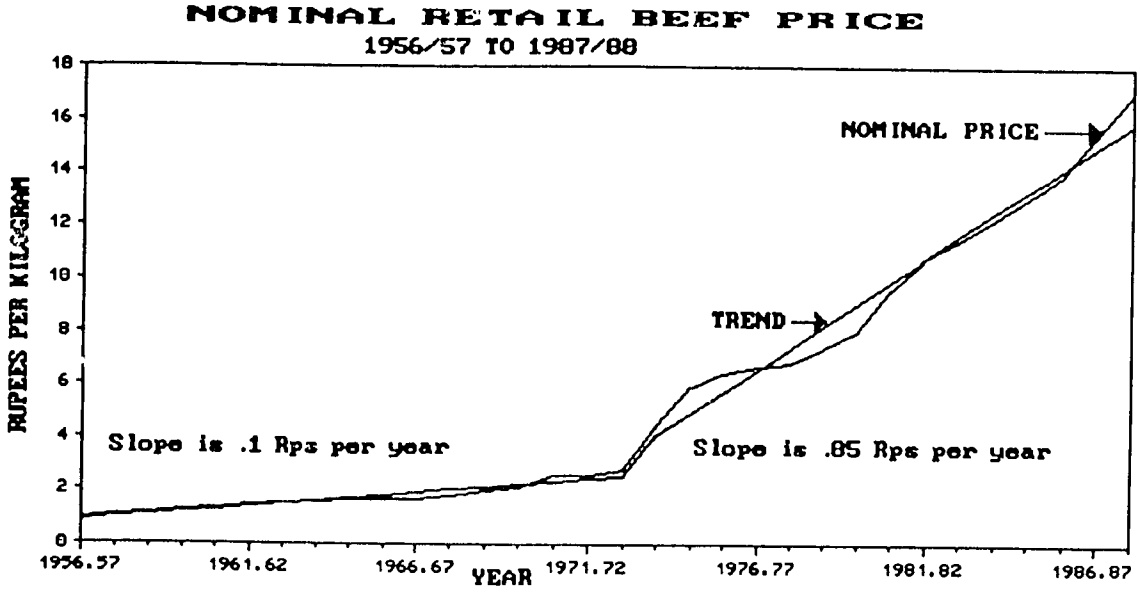


Figure 4.6

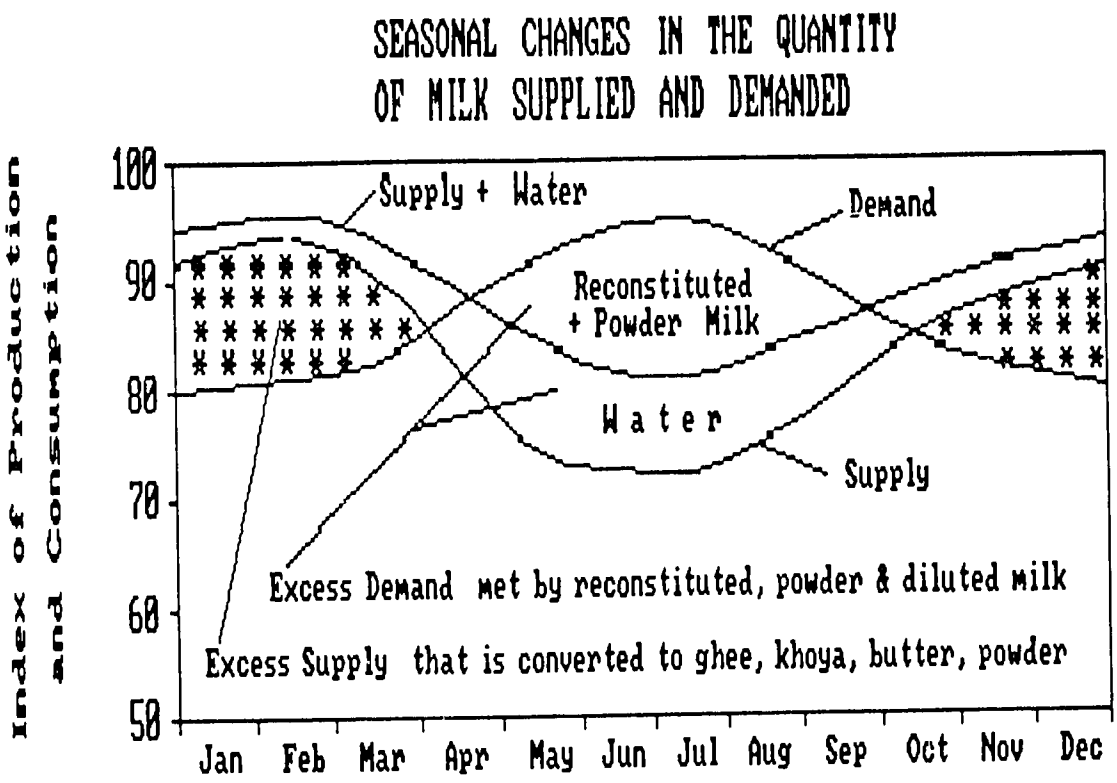


a shift to meat as a protein source. On the negative side, supplies of beef have been larger than normal due to the sales of draft animals for slaughter. Tractors have been replacing animal power so that oxen are not now needed on some farms. Since 1984/85 the tractor inventory has been growing at about 6 percent per year or roughly 14000 tractors. Each tractor replaces about 8 to 16 oxen. At this rate about 3-8 percent of beef produced per year could be attributed to oxen replaced by tractors. Reportedly, farmers do not immediately sell oxen after purchasing or renting tractors. The replacement process is probably relatively slow as farmers keep oxen for purposes other than power. At this point the beef meat market supplies appear to be made up mostly of spent animals. However, if milk prices continue to run below inflation the lack of price incentive will eventually cause dairy farmers to sell herds for slaughter. The added supplies of beef would depress beef prices.

4.2 Seasonality of Milk Production, Consumption and Prices

The general perception is that milk production, consumption and prices follow a recurring seasonal pattern. Milk demand increases during the summer when higher levels of energy are needed and when cool drinks and desserts are appreciated. On the other hand, milk production declines during the summer and rises during the winter. Dairy buffalo milk production declines during the summer when the animals are stressed in the hot weather. This is not true for dairy cows which are more productive during the summer. However, as noted earlier most milk produced in Pakistan is from dairy buffalos. During the summer, when demand is seasonally high and supplies are seasonally low, the gap is filled by adding water and ice to fresh milk, reconstituted and powder milk. A graphic depiction of this concept is shown in Figure 4.7.

Figure 4.7



To some extent, the seasonal patterns shown above are similar to actual observation. Production of milk from example herds follow the pattern of supply shown above. In addition, the seasonal in milk prices exhibits an increase during the summer months possibly reflecting both an increase in demand as well as a decline in quantity produced.

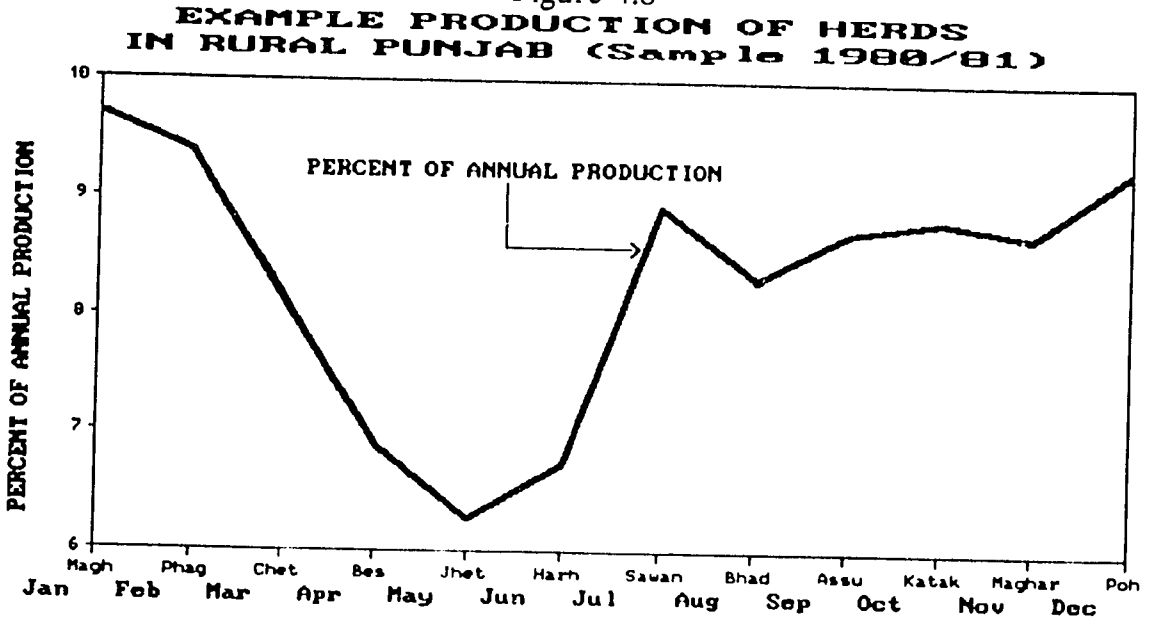
4.2.1 *Seasonality of Milk Production*

Solid data on actual patterns of milk production are scarce. One set of carefully compiled data (6) is presented in Figure 4.8 as well as Table 4.1. These data were obtained in 1980-81 from 55 small herds in a rural area of Punjab and represent all milk produced by an average herd, with milk of buffaloes and cattle separated. The low month for buffaloes was Jhet (May-June) with 114.6 kg. milk produced versus the high month Magh (Jan-Feb), with 215.4 kg., or 88 percent higher than Jhet. (Data were collected from farmers according to local months. English months also are cited, clarifying seasons.) This pattern corresponds with the widely recognized winter flush of milk production, and summer shortage.

Table 4.1 Annual Distribution of Milk Production in Rural Punjab, Buffalo and Cattle-Keeping Households, 1980-1981.

Months		Buffaloes		Cattle		All Animals
Local	English	Total Milk	Percent	Total Milk	Percent	Percent of Total Milk
Magh	Jan-Feb	215.4	9.94	32.0	8.41	9.71
Phag	Feb-Mar	205.1	9.38	36.2	9.52	9.40
Chet	Mar-Apr	173.4	8.01	35.8	9.41	8.22
Bes	Apr-May	138.0	6.37	37.1	9.76	6.88
Jhet	May-Jun	114.6	5.29	44.7	11.75	6.26
Harh	Jun-Jul	131.7	6.08	39.8	10.47	6.73
Sawan	Jul-Aug	189.0	8.73	38.3	10.07	8.93
Bhad	Aug-Sep	186.8	8.62	25.7	6.76	8.34
Assu	Sep-Oct	200.4	9.25	21.7	5.71	8.72
Katak	Oct-Nov	203.7	9.40	21.2	5.57	8.83
Magha	Nov-Dec	201.0	9.28	20.6	5.42	8.70
Poh	Dec-Jan	209.1	9.65	27.2	7.15	9.28
	Total	2166.2	100.00	380.3	100.00	100.00

Figure 4.8



The seasonal pattern for cows in this study area was sharply different, offsetting slightly the buffalo pattern. The low month was Maghar (Nov-Dec) with 20.6 kg. versus the high month Jhet (May-Jun) with 44.7 kg. With smaller numbers of milking cows and lower yields, total milk from cattle was only 18 percent compared to buffalo milk. But this potential of milk cattle to offset the seasonal low of buffalo deserves further study, especially in the context of improving cattle genetically by crossbreeding with Fresians.

The seasonal pattern for other types of producers is different. For example, owners in the large Landhi Cattle Colony at Karachi attempt to maintain the same number of animals milking in all seasons. Their pattern of production is therefore nearly flat, influenced primarily by variations in the adequacy of feeding. Indeed, many producers there contract with buyers to sell a fixed amount of milk daily for a full year, showing confidence they can maintain essentially constant production. Also, the small number of rural commercially oriented producers probably achieve patterns with less violent swings, through improved feeding and greater attention to breeding.

Field discussion of the seasonal issue in the course of this analysis, and review of previous analyses, emphasized breeding. Buffaloes are easiest to breed in the fall and early winter for calving from about July to October. The GTZ Report (6) includes careful and detailed exploration of reasons for the pattern of production of buffalo milk. It concludes that buffaloes are difficult to breed successfully when either the females or males are poorly fed. Further, farmers realize that there will be a shortage of feed, especially nutritious feed, in the early summer and mid-summer. Hence, they take this into consideration in breeding.

Nutritional deficiency also depresses production in the summer because many animals do not get sufficient nutrients in mid-lactation, and this especially affects those which calved in the prized August-October period. Lactating animals that experience more than a substantial feed deficiency for more than a very brief time, will not regain their potential yield and likely the lactation period will be shortened. Poor nutrition is thus devastating from two major angles, not only its effect on overall efficiency of milk production, but also due to its effect on seasonality.

4.2.2 *Imports of Milk and Milk Products*

Imports of milk are used to offset the decline in milk production during the summer months. Pakistan has imported significant amounts of dairy products, mainly milk powders, for many yearss as shown in Table 4.2. During 1960's and early 1970s, some fluid milk was produced by recombining imported nonfat dry milk and butterfat, especially in the Karachi area. Most historical analyses associate this practice with creating a poor image for pasteurized milk. More recently, imported milk powders have mainly been used as supplements.

During the summer, skim or full cream milk powder may be added to the available supply to meet marketing needs. Throughout the year, nonfat dry milk may be added to raise the milk solids level, especially in diluted milk. A moderate amount of dry milk is imported in

consumer packages which is widely available in shops, especially in higher income areas. A few shopkeepers in urban areas repack bulk powder in consumer packets, to be re-constituted with water by the household.

The combined imports of butter and butter oil have exceeded 5,000 tons in a few years. While the total value is much lower than for dry milk products, the milk equivalent of this butterfat is very substantial. The total quantity of imported milk powder in most years has ranged between 20-30 thousand tons, reaching a total cost of over Rs. 400 million annually at recent prices.

Milk imports data are difficult to locate on a consistent basis, hence, data from primary and several secondary sources were brought together in Table 4.2 which provides a summary in terms of total value, calculated milk equivalents, and the percentage relationship of imports to domestic production. Detailed data on imports of milk products is presented in Appendix Table. These data include the categories "Baby Milk Food" and "Food for Infants and Adults", which are substantial in some years and sometimes are omitted from dairy imports. The total cost of imports has risen to Rs. 700 to 800 million annually in recent years. It may be noted that a major portion of imports constitutes grants, or highly concessional sales, primarily from EEC, WFP or U.S. P.L. 480. Imports have averaged about 300,000 tons recently, in milk equivalent terms. Both volume and value have been rather steady since 1982/83. On this basis, imports have ranged from about two to five percent of annual milk production.

Table 4.2 Milk Production and Dairy Imports 1975-76 to 1986-87

Year	Estd. Milk Production (000 Tons)	Dairy Imports Value (Mil Rs)	Dairy Imports Milk Equiv. (000 Tons)	Imports/ Production (Percent)
1975/76	8,348	313.0	329.2	3.94
1976/77	8,524	251.0	165.8	1.94
1977/78	8,704	391.1	448.5	5.15
1978/79	8,888	321.6	237.0	2.67
1979/80	9,075	481.9	420.4	4.63
1980/81	9,267	552.3	352.8	3.81
1981/82	9,462	522.6	275.8	2.91
1982/83	9,662	736.8	357.4	3.70
1983/84	10,242	802.1	397.4	3.88
1984/85	10,856	712.0	315.6	2.91
1985/86	11,508	779.2	282.4	2.45
1986/87	12,198	747.6	310.7	2.54

Note: Milk equivalents applied using FBS conversion factors.

Source: Pakistan Economic Survey Data; Imports data from Federal Bureau of Statistics.

These milk equivalent figures must be interpreted cautiously. This approach is crude at best, applied to represent an original product containing many nutrients, and reaching Pakistan in varied and not precisely known combinations. The primary caution is that the process consistently overstates milk imports, and very substantially in some years. This occurs since the simple approach estimates the entire whole milk equivalent of each product, even though each has varying proportions of butterfat and nonfat solids (from none to 100% each), leading to double counting. Rough estimates were made for selected years, applying estimates of butterfat and nonfat solids equivalents separately. The discrepancy is great for a year such as 1982/83, when imports of butter and butter oil (ghee) were low. The overstatement theoretically could reach 100 percent, if all imports consisted of either butter/butter oil or skim milk products. That situation nearly occurred in 1977/78, when the nominal milk equivalent of imports was greatest, over five percent, but realistically should be estimated at scarcely three percent. Thus, some generalized statements about the problem of dairy imports may overstate the degree of competition with domestic production.

Milk imports and policy issues such as import duties and taxes are of concern. The problem centers around Southern Sind and how it can be supplied enough milk in the future, without substantial imports. Imported powder also is critical as the industry now functions, in filling in seasonal needs, and restoring the solids level in diluted milk.

4.2.3 *Seasonality In Milk Prices*

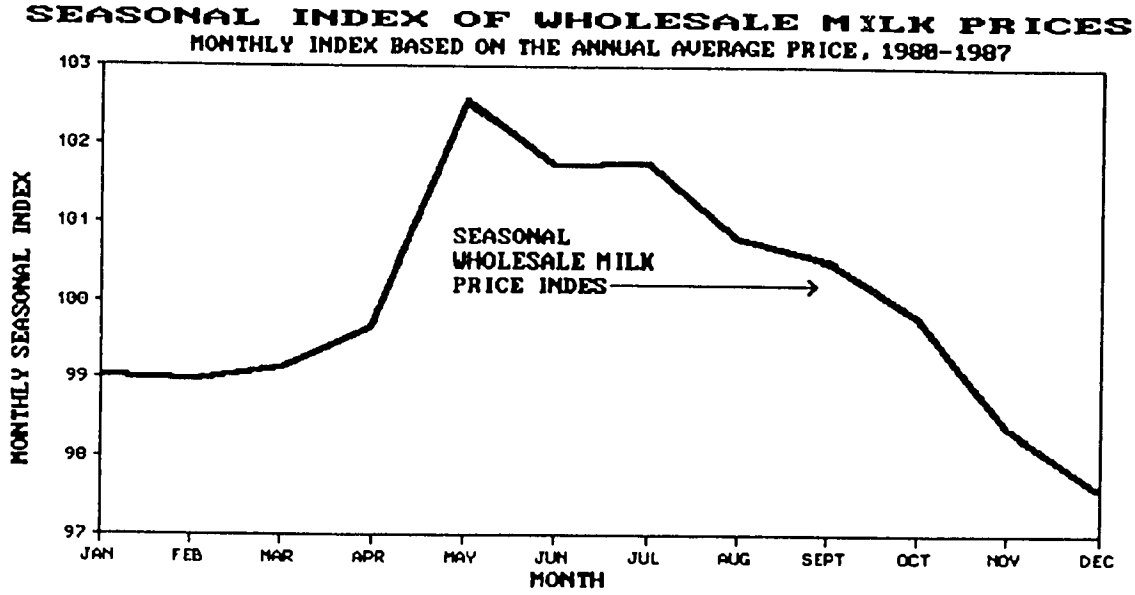
Simple supply-demand relationships predict higher milk prices during the summer and reduced prices during the flush season. However, for consumers, the price of milk generally varies by a somewhat small amount. The price goes up periodically but it does not exhibit exact seasonal fluctuations. Most likely the seasonal is diffused by the addition of water and the substitution of powder milk. Milkmen are thus able to meet various levels of increased demand. The seasonal variation in the officially reported wholesale milk price data are statistically significant between the winter and summer seasons but not for individual months. Seasonal milk prices generally follow the pattern shown in Figure 4.9. Milk prices rise during the summer and fall during the winter.

4.2.4 *Conversion of Milk to Storable Products*

During the flush season, when milk supply is abundant and demand low, excess milk could be converted into dry milk powder which would help to alleviate the problem of importing dry milk and the locally produced powder could be used to reconstitute milk during periods of low supply and high demand.

Most rural farm households which produce and sell milk are already in the habit of converting their excess fluid milk supplies to ghee. However, given the amount of effort and fuel used in the conversion process, most farmers tend to sell milk provided that option exists and an acceptable price is offered. At the present price structure of desi ghee (Rs. 45-50 per kg), the farm family would be better off by selling milk at Rs. 2.50 per litre or higher rather than converting it into ghee. As fluid milk collection is extended to remote

Figure 4.9



rural areas and the milk prices rise, more and more farmers will sell raw milk instead of ghee. However, in the absence of marketing opportunities, there seems no other option than to convert excess milk into desi ghee.

In summary, the concept as depicted in Figure 4.7 is largely observed in the dairy industry. Production and supply tends to be lower during the summer months, from roughly April through September, and higher thereafter. On the other hand, prices tend to be higher during the summer months and lower during the winter months because it is thought that demand is higher during the summer at the time when production is at a low ebb. Production is supplemented with additional ice during the summer, as well as, powder milk. When demand is low and production is low additional amounts of milk are converted to more storable ghee and in some cases powdered milk.

4.3 Factors Affecting Milk Demand and Supply

From the consumers point of view retail milk price and the level of income are generally the most important factors that determine household level of milk consumption. As incomes rise, most people tend to consume more dairy products which include fluid milk as well as milk-based products. Though the relative proportion of income spent on dairy products goes down with increased levels of income, the level of milk product consumption becomes inelastic to changes in very high incomes. Other factors that positively affect the level of milk consumption include number of children in a household. On the other hand, the number of females in the household is negatively correlated with milk consumption. Education level, however, is not significantly associated with milk consumption. These relationships are, for the most part, confirmed by research (3).

From the producers point of view the price of milk, ghee and beef are the major factors that encourage production. On the other hand, milk production is constrained by feed availability and the time involved in the reproduction and lactation process. Recently milk prices have not been increasing faster than inflation and have not been a positive influence on milk production.

To show the potential for increases in production in the future a simple simulation model has been constructed as follows:

(1) $P = 4.76 - 0.0326(Q/POP) + 0.00078(I/POP)$

(2) $Q = 6431 + 1064\ (Pavgt\text{-}1)$, where:

P	=	Retail milk price (Rs./Litre)
Q	=	Milk production (thousand metric tons)
I	=	Gross Domestic Product (million Rs.)
Pavgt-1	=	5 year moving average of the retail price of milk lagged one year.
POP	=	Population (millions)

Based on the simulation above, which is for the most part driven by income or per capita Gross Domestic Product, it can be seen that milk production per capita will not increase significantly if incomes grow at about the same rate as inflation or at about 7 percent per annum. In this case, slow growth in income prices results in the lower flat projection of production from 1988 to 2000 (Figure 4.10). With higher levels of income increases, at say 14 percent per year per capita production continues on its upward climb. In this case, the stagnating per capita production scenario appears more realistic since milk prices have been increasing at relatively slow rates with some shifts in food consumption habits away from milk to fruits, vegetables and meat. Under the current system for estimating milk production and dairy cow numbers, the actual decline or stagnation will not become evident until a new animal census is conducted.

The corresponding price scenario (Figure 4.11) shows prices increasing with higher growth in income. However, it should be noted that price increases similar to those in the low price scenario represent growth rates of the recent past and result in stagnating production. The relationships from which this simulation is constructed are statistically significant and they follow what appears to be the expected and logical association of prices, income and production. However, they are used here as a demonstration and not as confirming evidence. The data used to fit the relationships are in some cases simple extrapolations and the relationships could be spurious.

Many research studies (1,2,7) have estimated price and income elasticity coefficients for milk and other dairy products. The range of such estimates is quite wide because of many factors such as differences in methodologies, data sets, time periods, commodity groupings and sets of assumptions used etc. However, it is generally agreed that the price elasticity of milk is around 0.6 to 1.2 and that elasticity with respect to income is in the range of 0.5 to 1. In the simulation discussed above, the price flexibility used is 0.7 and the price

Figure 4.10

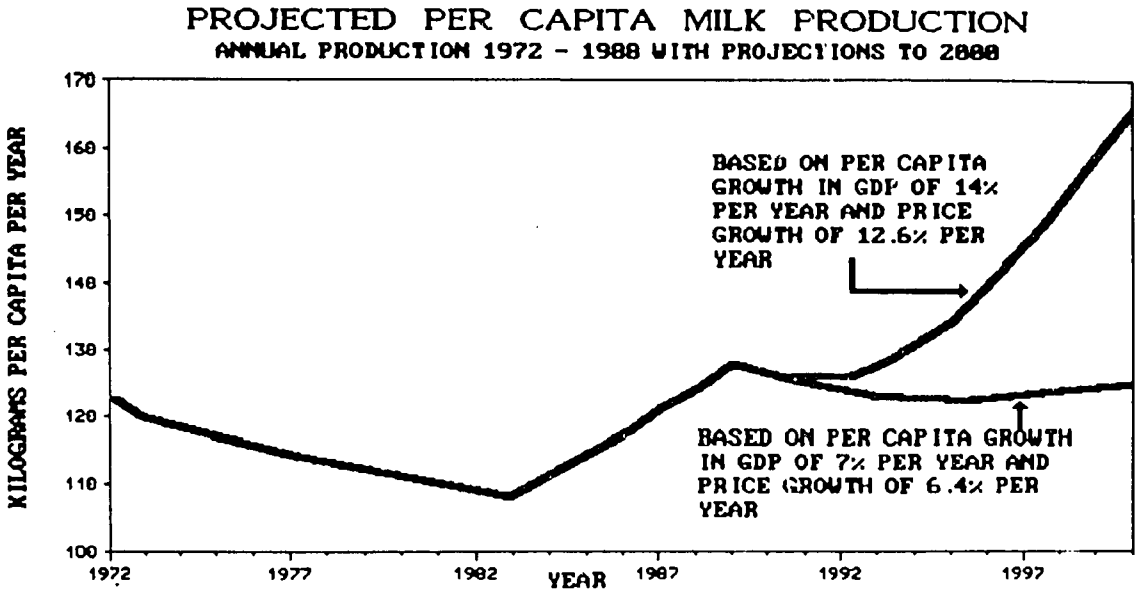
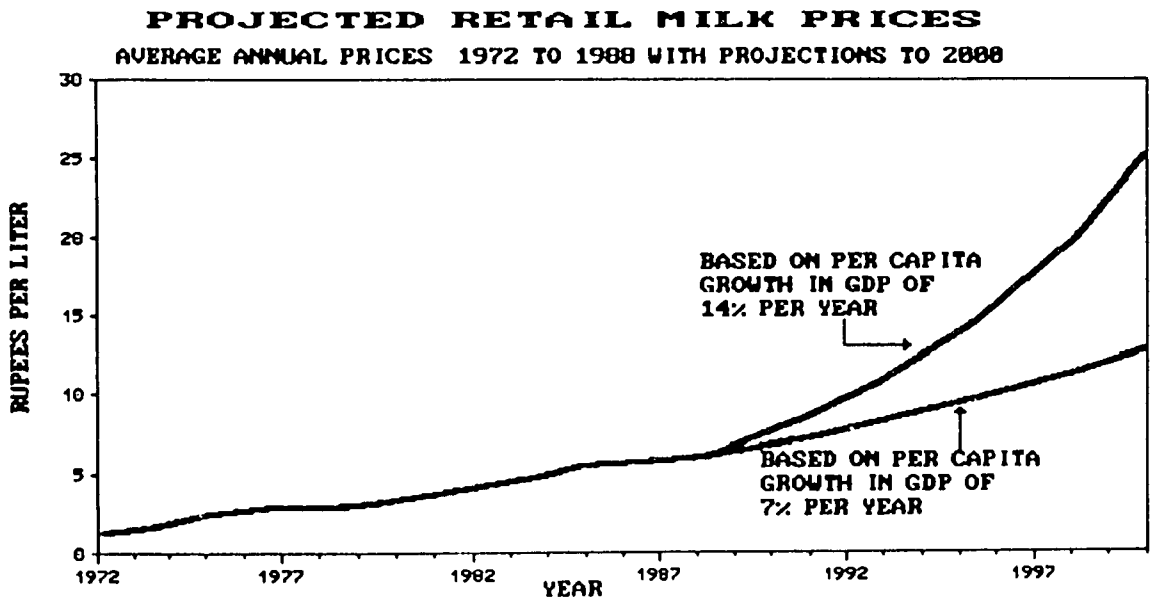


Figure 4.11



elasticity with respect to income is 0.9. The supply response elasticity is 0.44.

Despite price increases in the recent past, retail prices of milk and beef are relatively lower compared to the neighboring countries. In general, milk and beef prices have increased in line with the rate of inflation which averaged around 10 percent during the past decade. The interdependence of the price of milk and beef is quite strong. An increase in the price of beef relative to the price of milk induces dairy farmers to sell or slaughter cattle for beef. This trend, if continued for some time, depresses the supply of milk thus exerting an upward pressure on milk prices.

As mentioned above, consumer income is the major factor affecting demand for milk and milk products. This dependence, however, decreases with increased incomes because the relative share of income spent on dairy products decreases. Consumer incomes during the past decade have increased at a rate of 2-3 percent per annum, resulting in increased demand for milk and other dairy products.

The growth of population in general and the increase in the relative proportion of smaller age groups in the population also increase the demand for milk and milk products. Pakistan's population is estimated to grow at 3 percent per annum exerting a strong effect on the demand for livestock products. As most of the milk is produced in rural areas, the milk deficient urban areas show a stronger dependence or sensitivity to milk supplies. The rate of urbanization (4-5 percent annual growth during the past decade) is also an equally important factor that affects the demand for milk and milk products.

5. DAIRY INDUSTRY POLICY RECOMMENDATIONS

Recommendations on policy measures for the dairy industry are focused on the UHT industry. This is because of the immediacy of the problem and the large public investment at stake. If specific measures are not taken, many of the UHT plants are likely to fail. This would result in financial losses to the private entrepreneurs and public sector financial institutions. Furthermore, the confidence of investors in the dairy industry would be undermined. The primary responsibility for the success or failure of the UHT industry rests with the private sector and the financial institutions which financed it. The government's role should be limited to ensuring that the industry is not unjustifiably penalized with respect to taxes, regulations and other policies and that it has the opportunity to compete fairly with other products in the marketplace. The specific dairy industry policy recommendations are summarized as under:

5.1 Do Not Sanction Additional UHT Plants

In view of the existing excess capacity and low demand expansion for UHT milk, the obvious recommendation is that no more UHT processing plants be set up in the country. There is more production capacity already installed or underway than is warranted by the most optimistic projections of the growth in demand for UHT milk. As other reports have pointed out, most UHT milk plants have been financed by both domestic and international lending agencies without adequate market analysis. In addition, the government has been unable to monitor these developments and has allowed financial institutions to, in effect, make dairy policy for the country. The result of this spectacular, and largely unplanned, growth in UHT milk processing capacity is that most plants are operating at such low levels of capacity that they are unable to meet their variable costs and a number of them will probably close down in the future.

The existing critical situation of the UHT industry could have been avoided if the Federal Dairy Development Board were more active and vigilant in monitoring the expansion of UHT milk processing capacity. There is also a need to review the lending policies of the financial institutions involved for regulating the levels of equity required for investment in new capacity and over-invoicing etc. Also, an active coordination among all the concerned agencies of the government such as National Livestock Development Committee, Federal Dairy Development Board and the financial institutions is a must for a viable dairy sector.

5.2 Promote Development of Market Economy Based Industry

As discussed in detail earlier, development of the dairy industry has passed through various start up stages. The more recent development of UHT milk processing, except for its wasteful buildup of overcapacity, has brought about an important change in the traditional milkman dominated milk marketing in Pakistan. The overcapacity situation will continue

to be a handicap to UHT plant owners during the coming years but that should not lead to abandoning the industry. There is some sign of renewed interest in pasteurization and the future development of the dairy industry may well be in this direction. However, it is important that the government and the financing institutions do not try to force the pace of development but let the industry develop in response to market stimuli. The government should therefore promote the development of a market based industry by removing all regulations and policies which impede its efficient. Some of the suggested policy actions are shown below.

5.2.1 *Remove Export Ban on Dairy Products*

The current ban on dairy products export is unnecessary. The modern milk processing industry is producing refrigerated yogurt, ghee and cheese along with UHT milk for the domestic market. Removal of the existing ban on the export of dairy products will not have any significant impact on the domestic market because exports are likely to be a small proportion of total milk production. The entire UHT industry is using only less than 2 percent of the total milk produced in the country, 85 percent of which is utilized for processed UHT milk. In addition, there is a weak likelihood of finding a sizable competitive UHT milk market overseas.

5.2.2 *Reduce Import Duties on Packaging Materials*

One of the main reasons for the high cost of UHT milk is the packaging cost which accounts for about one-fourth of the total. While this high packaging cost is to some extent inevitable, given UHT processing technology, it is also due in part to government taxes on packaging materials. Altogether, these various duties and taxes are estimated to add approximately Rs. 0.50 per litre to packaging and hence UHT milk processing cost. At the same time, the existing duty structure on imported packaging material has virtually created a monopoly for Tetra Pak Ltd. Duties and taxes amounting to over 120 percent on the import of finished paperboard cartons are prohibitive for plants to contemplate purchasing alternative packaging systems. It should also be noted that, with a ban on exports, import duties cannot be recovered from duty draw backs.

5.2.3 *Revise SNF Standard for UHT Milk*

According to the Pure Food Laws established by the government, the solids not fat (SNF) content of 'standardized' milk should be at least 8.9 percent. Since the average SNF level of raw milk procured by milk plants ranges between 6-8 percent, they have to add SMP to raise the SNF content to the prescribed level. The current milk standard seems to be excessive as most cattle milk produced in the country does not contain this level of SNF. Lowering of the SNF standard from 8.9 to 8.5 percent, on the other hand, would not only make the regulation more realistic but reduce UHT milk processing costs by Rs. 0.15-0.20 per litre.

5.2.4 *Abolish Meatless Days and Price Controls on Beef*

This policy could be reviewed from the standpoint of its actual performance, with special attention to the income needs of the livestock industry . The impact may be slight, but even an image of discriminating against low-income livestock producers, especially the landless dairy herd owners, appears regrettable. The existing price ceilings on meat, and particularly beef, need to be removed because these are not only discriminatory but also seem ineffective and invite corruption.

5.3 Take regular Inventory of Milk Animals

Given the existing discrepancy and the range of estimates of livestock numbers and consequent milk production level, it is strongly recommended that existing data collection and analysis capability in the livestock field be improved. Beginning with the crucial question of livestock numbers and herd inventory to production costs and farm level prices, are some of the basic foundations on which future sectoral development plans depend upon. The desired action demands taking an inventory of buffaloes and cows in the country on an annual basis not only to properly monitor the impact of dairy programs and policies but also to diagnose problems in crisis situations.

Livestock products are a crucial part of Pakistan's food supply. The number of livestock are the production foundation for the supply of livestock products. The current extrapolation method does not provide an early warning for critical and politically destabilizing shortages of milk and meat. However, annual statistically significant estimates of livestock numbers would show the ever present cattle cycle and some warning of impending shortages or heavy supplies.

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ANNEX A

Composition of National Livestock Development Committee

1. Minister of Food, Agriculture and Cooperatives ..... Chairman
2. Representative of Ministry of Industries ..... Member
3. Representative of Central Board of Revenue ..... Member
4. Representative of Ministry of Commerce ..... Member
5. Representative of Ministry of Finance ..... Member
6. Representative of PARC (Animal Sciences) ..... Member
7. Director, Animal Production, PARC/NARC ..... Member
8. Chief, Planning Division, MINFA ..... Member
9. Agriculture Development Commissioner, MINFA ..... Member
10. Inspector General Forest, MINFA ..... Member
11. Secretary, LIvestock, Punjab ..... Member
12. Secretary, Livestock, Baluchistan ..... Member
13. Director General, Livestock (Extension), Punjab ..... Member
14. Director General, Livestock (Research), Punjab ..... Member
15. Director, Veterinary Research Institute, Lahore ..... Member
16. Director, Artificial Insemination, Lahore ..... Member
17. Director, Livestock Farms, Lahore ..... Member
18. Director, Livestock Prod. Res. Inst. Bahadurnagar .... Member
19. Director, Animal Husbandry, Sind ..... Member
20. Director General, Animal Husbandry, Baluchistan ..... Member
21. Director, Animal Husbandry, N.W.F.P. ..... Member
22. Director, Animal Husbandry, Northern Areas ..... Member
23. Director, Animal Husbandry, Azad Kashmir ..... Member
24. Director, Remount, Veterinary and Farms, GHQ ..... Member
25. Dean, Animal Husbandry, Agri. Univ., Faisalabad ..... Member
26. Project Director, Poultry Research Institute, Karachi. Member
27. Director Project Loans, Agri. Dev. Bank of Pakistan .. Member
28. Deputy Animal Husbandry Commissioner (M&M), MINFA .... Member
29. One dairy farmer ..... Member
30. Animal Husbandry Commissioner , MINFA ..... Secretary

ANNEX B

Composition of Federal Dairy Development Board

Official Members

1. Minister of Food, Agriculture and Cooperatives ..... Chairman
2. Secretary, Livestock Division, Ministry of Food, Agriculture and Cooperatives ..... Vice Chairman
3. Representative of Ministry of Commerce ..... Member
4. Representative of Ministry of Education ..... Member
5. Representative of Ministry of Finance ..... Member
6. Representative of Ministry of Industries ..... Member
7. Representative of Ministry of Planning ..... Member
8. Representative of Agriculture Research Council ..... Member
9. Representative of Central Board of Revenue ..... Member
10. Representative of Army Veterinary and Remount Service. Member
11. Secretary, Livestock, Baluchistan ..... Member
12. Secretary, Livestock, Punjab ..... Member
13. Director, Animal Husbandry, Azad Kashmir ..... Member
14. Director, Animal Husbandry, N.W.F.P. ..... Member
15. Director, Animal Husbandry, Sind ..... Member
16. Representative of Agri. Development Bank of Pakistan . Member
17. Representative of Ind. Development Bank of Pakistan .. Member
18. Rep. of National Bank, Supervised Ag. Credit Scheme .. Member
19. Representative of PICIC ..... Member
20. Representative of Livestock Division ..... Member
21. Animal Husbandry Commissioner, MINFA ..... Secretary

Non-Official Members

1. Representative of Pakistan Dairy Association ..... Member
2. Representative of Milk Plant Owners Association ..... Member
3. Representative of Dairy Engineers ..... Member
4. One dairy farmer from each province ..... Member

The Board may invite other persons from time to time as deemed necessary.

ANNEX C

List of Persons Interviewed

Dr. M. Anwar Khan, Animal Husbandry Commissioner,
Technical Unit, Livestock Division, MINFA, Islamabad.

Dr. Syed Mohammad Ishaq, Ex-Director,
Livestock Farms and Extension, Government of Punjab, Lahore.

Dr. Malik Sultan Mubariz, Director, Extension and Health,
Livestock Department, Govt. of Punjab, Lahore.

Dr. M. Jameel Khan, Director,
Punjab Economic Research Institute, Lahore.

Dr. Richard Wheeler, Chief of Party (and others),
Land O'Lakes Dairy Study Team, USAID, Islamabad.

Dr. Hill, Team Leader,
Pakistan Livestock Sector Study, FAO/ADB.

Dr. Muhammad Anwar, Coordinator,
Dairy Cooperative Union, Renala Khurd, Dist. Okara.

Agha Fauad Sami, Senior Marketing Officer,
Agriculture and Livestock Marketing Advisor, Karachi.

Agricultural Development Bank of Pakistan, Lahore.
Mian Muhammad Saeed Ahmed, Manager Model Branch,
Mr. Saeed M. Cheema, Regional Manager,

University of Agriculture, Faisalabad.
Dr. Agha Sajjad Haider, Professor (Agri. Econ)
Dr. Raza Ali Gill, Professor (Animal Husbandry),

Livestock Department, Government of Sind, Karachi.
Dr S. M. Athar, Director General,
Dr. Azhar Rafique, Asstt. Director (A.H.),

Livestock Prod. Res. Institute, Bahadurnagar, Dist. Okara.
Haji Ali Asghar, Research Officer (Buffalo),
Mr. Mohammed Rafiq, Information Officer,

Lahore Milk Plant, Lahore.
Ch. Rehmat Ullah, Manager, Marketing & Personnel
Dr. Naqvi, Production Manager,

Milk Pak Limited, Lahore.
Mr. Yawar Ali, Managing Director
Mr. Abrar Ahmad, Deputy Manager (Training)
Mr. Ather Ayub Khan, Production Manager
Mr. Ghulam Dastgir, Manager, Milk Collection , Lahore
Dr. Muhammad Ashraf, Manager, Milk Collection, Bhawana

Milkways Ltd., Tandlianwala, Dist. Faisalabad.
Chaudhry Nazir Ahmad, Chief Executive,
Dr. A. T. M. Naqvi, Managing Director,

MAS Dairies Limited, Hyderabad.
Mian Vaqar Akhtar, Managing Director
Mr. Shahid Termazi, Marketing Manager
Mr. Sajjad Ali, Production Manager

Pakistan Dairies Ltd., Sahiwal.
Mr. Jehan Zeb, Managing Director,

Mr. John E. Rawle, Project Co-ordinator,
Granada International, Uqab Dairy Farms, Hyderabad.

Mr. Aleem Hussain, Managing Director,
Agro-Dairies (Pvt) Ltd., Lahore.

Mr. Irfan Monnoo, Owner-Manager,
Monnoo Dairies, Bhawana, Dist. Jhang.

Mr. Khalid, Owner/Manager,
Chand Dairy Farm, Karachi.

Haji M. Yaqub, Producer/Official,
Landhi Cattle Colony, Karachi.

Mr. Mohammed Rahim Pillu, Secretary
Milk marketing and "auction" center, Lee Market, Karachi.

Mr. Muhammad Bashir, Secretary,
Cattle Owners's Association, Hurbanspura, Lahore.

APPENDIX Table

Imports of Dairy Products, 1975/76 TO 1986/87

CODE NUMBER	CONVRN IMPORT ITEM	FACTOR	1975-76 TONNES	1975-76 RUPEES (000)	1975-76 M.E.(T)	1976-77 TONNES	1976-77 RUPEES (000)	1976-77 M.E.(T)	1977-78 TONNES	1977-78 RUPEES (000)	1977-78 M.E.(T)
223001	Milk, Fresh Whole	1.00	0.0		0.0			0.0			0.0
	Milk, Fresh Skim	1.00	187.5	375.0	187.5			0.0			0.0
	Buttermilk, Fresh	0.40			0.0			0.0			0.0
224100	Whey, Preserved Etc.	0.50			0.0			0.0			0.0
	Whey, Dry	5.00	270.4	1821.0	1352.0	89.7	820.0	448.5			0.0
	Whey, Evap. or Condensed	1.40			0.0			0.0			0.0
224200	Milk, Lowfat Dry (<1.5% BF)	7.86	7371.9	63575.0	57943.1	5023.5	31512.0	39484.7	24550.9	152176.0	192970.1
224301	Milk, Fatted Dry (>1.5% BF)	8.00			0.0			0.0			0.0
	Cream, Dry	11.81	29.2	198.0	344.9	0.7	9.0	8.3	21.3	315.0	251.6
980904	Ice Cream Powder	20.00			0.0			0.0			0.0
	Buttermilk, Dry	4.00	263.4	2972.0	1053.6	8377.6	97920.0	33510.4	5509.0	66147.0	22036.0
980901	Baby Milk Food	5.31			0.0			0.0			0.0
980902	Food for Infants/Invalids	7.86	1430.7	15332.0	11245.3	1079.0	22919.8	8480.9	3146.7	65599.0	24733.1
224901	Milk, Lowfat Condensed	2.63	12295.4	89539.0	32336.9	5993.0	49726.0	15761.6	879.7	5121.0	2313.6
224902	Cream, Preserved/Conc.	11.21	40.7	333.0	456.2			0.0	16.6	153.0	186.1
	Buttermilk, Evap./Condensed	1.05	56.6	504.0	59.4	498.4	4559.0	523.3	19.5	215.0	20.5
	Casein	2.00	22.0	216.0	44.0	26.8	243.0	53.6	75.6	695.0	151.2
240002	Curd	2.00			0.0			0.0	1.5	12.0	3.0
240001	Cheese	9.00	102.7	933.0	924.3	22.3	463.0	200.7	55.0	969.0	495.0
	Butter, Canned or Fresh	22.80	225.4	3475.0	5139.1	1327.0	19188.0	30255.6	1589.2	21015.0	36233.8
230003	Butter Oil (Ghee)	28.29	7708.7	133712.0	218079.1	1310.1	23605.0	37062.7	5976.9	78713.0	169086.5
	Others				0.0			0.0			0.0
	Total			312985.0	329165.5		250964.8	165790.4		391130.0	448480.3

Notes: 1. Conversion factors principally from Federal Bureau of Statistics, with additions required for complete coverage, and moderate amendments.

2. M.E.(T): Milk Equivalent Tonnes, using indicated conversion factors.

Source: Federal Bureau of Statistics (directly or consolidated from secondary sources).

CODE NUMBER	IMPORT ITEM	CONVRN FACTOR	1978-79 TONNES	1978-79 RUPEES (000)	1978-79 M.E.(T)	1979-80 TONNES	1979-80 RUPEES (000)	1979-80 M.E.(T)	1980-81 TONNES	1980-81 RUPEES (000)	1980-81 M.E.(T)
223001	Milk, Fresh Whole	1.00			0.0			0.0	6.0	23.0	6.0
	Milk, Fresh Skim	1.00			0.0			0.0			0.0
	Buttermilk, Fresh	0.40			0.0	474.2	1879.0	189.7	76.0	22.8	30.4
224100	Whey, Preserved Etc.	0.50			0.0			0.0	6.0	77.0	3.0
	Whey, Dry	5.00	2.2	22.0	11.0	58.9	589.0	294.5			0.0
	Whey, Evap. or Condensed	1.40			0.0	25.2	213.0	35.3	5.9	76.8	8.3
224200	Milk, Lowfat Dry (<1.5% BF)	7.86	9573.6	83579.0	75248.5	29402.9	241507.0	231106.8	26383.0	318077.0	207370.4
224301	Milk, Fatted Dry (>1.5% BF)	8.00			0.0			0.0			0.0
	Cream, Dry	11.81	38.1	668.0	450.0	20.4	326.0	240.9	60.3	847.3	712.1
980904	Ice Cream Powder	20.00			0.0			0.0			0.0
	Buttermilk, Dry	4.00	6664.3	70566.0	26657.2	4263.5	44287.0	17054.0	726.6	10094.1	2907.2
980901	Baby Milk Food	5.31			0.0			0.0			0.0
980902	Food for Infants/Invalids	7.86	4662.4	97480.0	36646.5	4237.3	98648.0	33305.2	6236.8	149160.0	49021.2
224901	Milk, Lowfat Condensed	2.63	2208.8	15225.0	5809.1	1335.8	9801.0	3513.2	1194.0	11246.0	3140.2
224902	Cream, Preserved/Conc.	11.21	28.6	250.0	320.6	62.9	519.0	705.1	51.3	440.2	575.1
	Buttermilk, Evap./Condensed	1.05	247.1	2486.0	259.5	52.6	374.0	55.2	126.3	1123.9	132.6
	Casein	2.00	9.5	66.0	19.0	12.2	147.0	24.4			0.0
240002	Curd	2.00	7.1	63.0	14.2	4.4	40.0	8.8	2.0	25.8	4.0
240001	Cheese	9.00	44.5	787.0	400.5	44.6	997.0	401.4	43.7	1234.3	393.3
	Butter, Canned or Fresh	22.80	377.7	5245.0	8611.6	559.7	8670.0	12761.2	825.4	13839.3	18819.1
230003	Butter Oil (Ghee)	28.29	2918.0	45139.0	82550.2	4266.8	73907.0	120707.8	2462.2	45949.1	69655.6
	Others				0.0			0.0		26.0	0.0
	Total			321576.0	236997.8		481904.0	420403.4		552262.6	352778.6

CODE NUMBER	IMPORT ITEM	CONVRN FACTOR	1981-82 TONNES	1981-82 RUPEES (000)	1981-82 M.E.(T)	1982-83 TONNES	1982-83 RUPEES (000)	1982-83 M.E.(T)	1983-84 TONNES	1983-84 RUPEES (000)	1983-84 M.E.(T)
223001	Milk, Fresh Whole	1.00	23.0	164.0	23.0	587.0	2348.0	587.0			0.0
	Milk, Fresh Skim	1.00			0.0			0.0			0.0
	Buttermilk, Fresh	0.40			0.0			0.0			0.0
224100	Whey, Preserved Etc.	0.50	12.0	116.0	6.0	1745.0	16667.0	872.5	7665.0	73281.0	3832.5
	Whey, Dry	5.00			0.0			0.0			0.0
	Whey, Evap. or Condensed	1.40			0.0			0.0			0.0
224200	Milk, Lowfat Dry (<1.5% BF)	7.86	21037.0	311585.0	165350.8	33422.0	442578.0	262696.9	12398.0	167966.0	97448.3
224301	Milk, Fatted Dry (>1.5% BF)	8.00	1193.0	12014.0	9544.0	5819.0	91332.0	46552.0	10368.0	173977.0	82944.0
	Cream, Dry	11.81	727.0	11327.0	8585.9	323.0	4441.0	3814.6	167.0	4102.0	1972.3
980904	Ice Cream Powder	20.00			0.0			0.0			0.0
	Buttermilk, Dry	4.00			0.0			0.0			0.0
980901	Baby Milk Food	5.31	1861.0	39864.0	9881.9	2497.0	76460.0	13259.1	2160.0	63741.0	11469.6
980902	Food for Infants/Invalids	7.86	2767.0	90283.0	21748.6	2252.0	78289.0	17700.7	2815.0	96957.0	22125.9
224901	Milk, Lowfat Condensed	2.63	796.0	9612.0	2093.5	1350.0	15097.0	3550.5	2188.0	29373.0	5754.4
224902	Cream, Preserved/Conc.	11.21	104.0	1257.0	1165.8	65.0	709.0	728.7	149.0	1639.0	1670.3
	Buttermilk, Evap./Condensed	1.05			0.0			0.0			0.0
	Casein	2.00			0.0			0.0			0.0
240002	Curd	2.00			0.0			0.0			0.0
240001	Cheese	9.00	31.0	1061.0	279.0	35.0	1444.0	315.0	31.0	1060.0	279.0
	Butter, Canned or Fresh	22.80	351.0	5232.0	8002.8	142.0	2792.0	3237.6	360.0	10983.0	8208.0
230003	Butter Oil (Ghee)	28.29	1735.0	40040.0	49083.2	145.0	4504.0	4102.1	5715.0	178996.0	161677.4
	Others				0.0		195.0	0.0			0.0
	Total			522555.0	275764.5		736856.0	357416.6		802075.0	397381.6

CODE NUMBER	IMPORT ITEM	CONVRN FACTOR	1984-85 TONNES	1984-85 RUPEES (000)	1984-85 M.E.(T)	1985-86 TONNES	1985-86 RUPEES (000)	1985-86 M.E.(T)	1986-87 TONNES	1986-87 RUPEES (000)	1986-87 M.E.(T)
223001	Milk, Fresh Whole	1.00	20.0	201.0	20.0			0.0			0.0
	Milk, Fresh Skim	1.00			0.0			0.0			0.0
	Buttermilk, Fresh	0.40			0.0			0.0			0.0
224100	Whey, Preserved Etc.	0.50	51.0	971.0	25.5	203.0	2686.0	101.5	153.7	2067.5	76.9
	Whey, Dry	5.00			0.0			0.0			0.0
	Whey, Evap. or Condensed	1.40			0.0			0.0			0.0
224200	Milk, Lowfat Dry (<1.5% BF)	7.86	10312.0	164370.0	81052.3	9915.0	148969.0	77931.9	5305.6	74250.4	41702.0
224301	Milk, Fatted Dry (>1.5% BF)	8.00	15882.0	255047.0	127056.0	15087.0	257352.0	120696.0	18178.6	327544.2	145428.8
	Cream, Dry	11.81	321.0	6209.0	3791.0	152.0	4034.0	1795.1	17.0	319.9	200.8
980904	Ice Cream Powder	20.00			0.0	1.0	36.0	20.0			0.0
	Buttermilk, Dry	4.00			0.0			0.0			0.0
980901	Baby Milk Food	5.31	1498.0	59921.0	7954.4	7318.0	224319.0	38858.6	3980.9	163550.9	21138.6
980902	Food for Infants/Invalids	7.86	4039.0	131072.0	31746.5	2467.7	79678.0	19396.1	790.5	38678.0	6213.3
224901	Milk, Lowfat Condensed	2.63	2593.0	32773.0	6819.6	3067.0	39916.0	8066.2	1531.5	21214.4	4027.8
224902	Cream, Preserved/Conc.	11.21	163.0	1993.0	1827.2	121.0	1998.0	1356.4	64.8	1069.0	726.4
	Buttermilk, Evap./Condensed	1.05			0.0			0.0			0.0
	Casein	2.00			0.0			0.0			0.0
240002	Curd	2.00			0.0	70.0	430.0	140.0			0.0
240001	Cheese	9.00	34.0	1364.0	306.0	44.0	1781.0	396.0	38.5	2034.1	346.5
	Butter, Canned or Fresh	22.80	178.0	4431.0	4058.4	116.0	3009.0	2644.8	125.1	3204.0	2852.3
230003	Butter Oil (Ghee)	28.29	1800.0	52641.0	50922.0	387.0	14968.0	10948.2	3110.2	113681.5	87987.6
	Others			1033.0	0.0			0.0			0.0
	Total			712026.0	315579.0		779176.0	282350.9		747613.9	310700.9

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