Social Cooperation Initiative
آغاز برائے سماجی تعاون

Research Report

Milk Value Chain Analysis in Project Area of District Lodhran

June 2013

Conducted By:
Social Cooperation Initiative-SCI

Acknowledgements:

This research report is outcome of the in-depth primary and secondary data collection carried out in relevance to the objective and scope of this research. This research is carried out by Social Cooperation Initiative (SCI) team and management along with close collaboration and support of IOM team towards inception of ***Milk Value Chain Management for Young Farmers in Lodhran.*** The SCI would like to extend gratitude to young milk producers and their communities of target area, SCI staff, district government livestock department officials, key stakeholders and gatekeepers, political representatives of target area and IOM staff for their pure efforts and support to project.

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PROJECT BACKGROUND:

Poor social indicators including health, education, income and poverty make South Punjab an impoverished region of the country. District Lodhran with estimated population of 1504,000 in 2010 and with 1,790 square kilometers area is located in Southern region of Punjab province on the northern side of River Sutlej. It is adjoined by districts of Multan, Khanewal, Lodhran and Bahawalpur. District Lodhran is further divided into three tehsils: Lodhran, Kahrorpakka and Dunyapur. Tehsil Kahrorpakka is comprised of 5 urban and 18 rural union councils.

Statistics indicate that a large portion of the population does not possess the required skills to find better jobs that lead to social and economic mobility. Agriculture and livestock development is the most important economic sector of Lodhran. There are 77,561 agricultural farms in District Lodhran spread over 550,380 acres and around 80 % of rural population generates its earning while being engaged in agriculture and livestock professions. The district has larger base of dairy sector allied with the agriculture which carry the enormous potential to generate employment and business opportunities in the district.

With around 428,000 goats, 233,000 buffaloes, 366,000 cows, and 40,000 sheep, Lodhran offers good opportunities for milk processing/dairy products, animal poultry field, dairy farms, meat/poultry processing units etc. Lack of organization of milk produces, absence of breeding services, inadequate fodder production and management, lack of access to markets, deficit in technology transfer has significantly affected the livestock in district. This has further contributed to reduce the income of rural communities from livestock and the situation has further gone worst due the exploitation of the middleman in the milk collection mechanisms. Currently milk marketing associations and/or cooperatives are non-existent in Lodhran district and consequently produce lacks power of related to milk management and marketing resulting in their low incomes. The young population of the area is adversely affected from this situation.

Shrinking economic and social spaces for youth in district disadvantages them and adds to their vulnerabilities. It has been evidenced that large number of young population has been attracted by the Madrasahs gradually leading youth to mobilize as a potential force for terrorism. It is aimed that targeting youth to transform them to the productive forces of the society will defiantly help to address their vulnerabilities and reduce their economic dependencies.

IN order the improve livelihood and economic wellbeing of young milk producers, SCI in partnership with IOM & USAID has initiated "Milk Value chain management" project in Tehsil Kehroo Pacca of District Lodhran. The proposed direct target groups for this project are marginalized **young, marginalized men and women** associated around milk production (farmers/tenants), management and sales of age ranging from 18-35 in **15** BASTI's *(Smaller*

unit of population, consisting of 150-300 House Holds).in 11 Mozas *(Larger Unit of Population as these Union Councils do not have villages rather Mozas)* of **2** Union Councils of Tehsil Kharoor Packa, District.

2.1 Objectives

- 450 young milk producers (men and women) of 15 villages of 2 target union councils acquire enhanced skills relating to milk production and management, better livestock management thus improving the quality of their products and increasing their household income.
- 450 young milk producers of 15 villages of 2 target union councils acquire a better understanding of sales and marketing and linkages with local milk markets thus increasing their household income.

2.2 Target Area

Project target area consists of 15 BASTI's *(Smaller unit of population, consisting of 150-300 House Holds).in* 11 Mozas *(Larger Unit of Population as these Union Councils do not have villages rather Mozas)* of **2** Union Councils of Tehsil Kharoor Packa, District.

Selected UCs	UC No	Population
Masa Kotha	66	17,304
Chelay Whan	68	19,965

EXECUTIVE SUMMARY:

The overall objective of the study was to assess the existing status of the livestock (dairy) sector in District Lodhran (Tehsil Kehroor pacca), through a value chain analysis, with particular focus on enhancing incomes of young milk farmers. The specific objectives included (i) Assess the existing situation; compile the available information and collect the additional information related to the dairy value chain in the area, looking at micro, macro and meso levels and (ii) propose an appropriate action plan for the implementation at needed levels.

Livestock plays an important role in the national economy. It contributes 11.2% to GDP. Its share in the value of all the agricultural commodities is 52.10%. Livestock is one of the major sources of livelihood for small marginalized and landless stockowners. Over 8 million families are directly involved with production and marketing of livestock. Several products from livestock are part of the food basket and a source of high quality nutrients. However, aamong all livestock products milk is the major one, and in many rural areas perhaps the only, source of nutrition especially for the children.

The share of rural milk producers in national production of 33 billion liters is 71%. The remaining comes from peri-urban and urban producers. District Lodhran has 90% of the area under cultivation. The major occupation is agriculture. The animal herd comprised of mixed animals with 5.15 heads on an average per household. The price of animals was very high. Some of the farmers also mentioned that they did not want to lose the breed and wanted to keep it. Over 60% buffaloes are maintained under subsistence system. Farmers keep 1-2 buffaloes in milk with a heifer or a young calf. The farmers grow some fodder and graze the animals on field bunds/road sides or canal banks. Depending on the location and access, only part of the milk is sold. Larger part of the production is consumed as raw milk or converted into ghee. The average lactation yield is around 1200 liters.

By and large the productivity per animal is low which is attributed to poor genetic resource and management practices. The seasonal fluctuations further compound the problem which is partly attributed to availability of green fodder and partly to predominance of buffalo in dairy. From mid-November to mid-February and May to early July, fodder shortage is maximum. Farmers have limited access to better varieties and cultural practices. The use of supplementary feeds is also limited. The quality of feeds is generally poor due to adulteration and prices are very high. The livestock health services are poor. Vaccination against *haemorrhagic spticaemia* and foot and mouth diseases is regularly done but still a large number of farmers have a limited access to vaccination programmes/campaigns mainly conducted by the public sector. Mineral deficiencies are quite pronounced. Both ecto and endo parasites (ticks, mange mites, round & tape worms) are commonly observed.

Daily milk production in the district is at about 2.18 million litres comprising of buffalo milk 73.4%, cow 25.9% and goat 0.7%. The information gathered from the stakeholders during the survey revealed that disposal of milk significantly varied from area to area. Larger proportion of the milk produced in urban and peri-urban areas was disposed of while it was vice versa in the case of remote areas. By

and large, almost 60 to 70% milk was sold. At farm household level, consumption of tea increased and replaced milk mainly due to economic constraints directly impacting rural families already at subsistence and below subsistence levels. The diminishing use of whole milk adversely impacted the nutritional intake, particularly for children. Discrimination between male and female child was also noted.

Production of milk falls to 55% of peak production at its lowest point in mid-June, while the demand increases 60% during this time compared to December when the milk supply is ample. The huge difference between lean and flush seasons is a significant problem. During the lean season, when the availability of the milk is very limited, the price goes up. During lean periods there is insufficient milk on the market and some of the processors have to close down their factories.

The informal marketing system for milk is characterized by the presence of a number of small sized farmers, milkmen (*doodhis*), milk processors, milk/dairy shops, vendors or *halwais* operating at different stages of milk value chain. Up to 70% milk was marketed through the *doodhis* and the remaining 30% was collected by the processing plants. Of this 30%, indirect collection through mini milk collectors or direct supplies from *doodhis* and farmers constituted 70%. The direct collection through village milk collection centres constituted the remaining 30%. The *doodhis* are the main intermediaries linking milk farmers in rural areas with consumers in urban centres. The milk is handled in crude way. A typical *doodhi* owns a few metallic containers/cans or plastic drums. The *doodhis* transport milk in these containers to shop keepers or *khoya* makers who maintain a set of boiling pans, buckets and earthen pot for making yogurt. The milk processors have introduced an organized system of milk collection by providing cooling tanks/chillers at farm level (cluster) and using refrigerated carriers. The milk collected at these cooling tanks/chillers (Nestle calls them as Village Milk Collection Centres) is transported to sub-centres and processing plants in refrigerated carriers. This has provided competition to the traditional milk collection system dominated by *doodhis* and has thus enabled rural farmers to obtain somewhat better prices.

The prices received by farmers varied from Rs.30 to Rs.35 per litres while consumer price varied from Rs.30 to Rs.35 per litre. The consumer price for processed milk was Rs.55 per litre. The main player in the traditional value chain included farmers, milk collector (*doodhi*) and retailer. Their share in consumer price has been estimated at 26%, 32% and 42% respectively. The share of value chain players in processed milk i.e. farmers, mini supplier, processor and retailer has been estimated at 21%, 24%, 50% and 5%. In spite of reservations about quality assessment (Fat & TS) on which prices are based, farmers preferred to sell to VMCCs (processing plant) and demanded expansion in their network. Farmers and consumers alleged that *doodhis* resorted to improper measurements and adulteration in order to maximize their margins. There was a general concern about adulteration both for fresh and processed milk in the absence of appropriate regulatory measures. The semi-commercial dairy farmers who have set up their own retail outlets are much better off as they obtained higher prices. Their sale price direct to consumer was Rs.33-35 per liter. The other marketing agents included de-creamers and khoya makers whose margin varied from Rs.10 to Rs.20 per kg. Desi ghee was also being prepared at farm level but reported has a diminishing market.

Milk Marketing Associations and Cooperatives are non-existent in Lodhran District. Therefore, it denies producers the benefits of economies of scale including improved bargaining power vis-à-vis marketing agents. In Pakistan Idara-e-Kissan (Halla) milk has demonstrated a successful model of milk cooperatives; PDDC, LDDB, processing plants (VMCCs) and private initiatives cluster approach. These help improve competitiveness and prices received by farmers.

The Pakistan dairy industry faces multiple challenges The issues mainly include small and scattered holders, making milk collection difficult and expensive, wastage of 20% milk due to poor marketing infrastructure, dominant role of traditional system of *doodhis* and contractors who do not have appropriate facilities for milk handling, limited and disjoined cool chain, malpractices and profiteering attitude of the marketing agents, lack of market information, capping of prices by the district administration, limited value addition, lack of credit facilities, weak institutional support, rampant poverty adversely impacting children milk consumption, gender bias and lack of stakeholders' capacity to efficiently deliver, etc.

In spite of various constraints, milk production has exhibited an increasing trend. Increasing demand and more precisely an existing supply demand gap can easily absorb any significant increase in production or supply. Government has fixed milk production target of 43 billion litres by 2010. Therefore, the future of dairy industry seems to be quite encouraging.

A value chain management approach is suggested that should address the issues and constraints of all direct and indirect players. The overall objective should be improving productivity and profitability of small dairy farmers and in particular the socio-economic uplift of women and better nutrition for the children.

INTRODUCTION

General

Over the past few years a dramatic transformation has occurred in agro-food supply chain systems in many developing countries. This is attributed to a number of factors that include growing urbanization, change in consumer incomes and preferences, increased products range, etc. This in turn has, *inter alia*, resulted into increased consumption of livestock and dairy products. In spite of economic crisis dairy products especially milk continues to be part of the daily diet of the larger proportion of the populace.

Taking its cognizance, many developing countries have re-oriented their production and marketing systems in order to benefit from the emerging market opportunities. A number of supply chains have been introduced by their participants/operators including farmers, processors, distributors and traders. Each supply chain has its impact on the overall value chain and distributive margins.

Pakistan is the fourth largest milk producing country in the world. Milk is produced in all the geographical units of Pakistan but Punjab has the largest share (more than 60%) in country's milk production. Punjab is also home to one of the largest milk producing area in Asia, which has the unique feature of having 15 private companies competing to collect milk for processing, including global giant Nestlé, Haleeb Foods, and Halla. Nestlé in Pakistan has over 20 years' experience of milk collection from rural Punjab while other milk processing units have also made significant inroads over the last 15 years. While commercial dairy farms are evenly spread, the milk district consists of regions in southern Punjab. The northern part of Punjab has been left alone by the industry where a vast informal network of traditional milk collectors, known as doodhis, is still collecting milk from dairy farmers as was the case in southern Punjab before building of the milk district.

Livestock is an important livelihood asset for rural population and acts as buffer against adversity and generates ready cash to meet social obligations and farm needs. The resilient nature of small ruminants offers an edge for stock replacement after natural disasters. Circumstantial evidence indicates rising interest in the livestock sector particularly at small and subsistence farms. Rural landless and poor are shifting to livestock production in the wake of decreased job availability. The livestock sector has huge capacity to absorb unskilled labour and arrest the migration to already crowded urban centers.

Livestock not only is a source of income but also provides cushion against crop failures particularly in the rain fed areas. It provided all the farm power for agricultural operations till early 70s. On introduction of mechanized farm power, the role diminished but still a sizeable farming community uses animal draught power. Most of the production takes place under subsistence units on smallholdings and landless holders.

Objectives and Background of the Study:

The overall objective of the study is to assess the existing status of the livestock (dairy) sector in District Lodhran (Tehsil Kehroor Pacca), with particular focus on enhancing incomes of the milk farmers. The specific objectives include:

(1) Assess the existing situation; compile the available information and collect the additional information related to the dairy value chain in the area, looking at micro, macro and meso levels.
(2) Propose an appropriate action plan for the implementation at needed levels.

A combination of information gathering and analysis techniques will be applied for undertaking the assignment. At the onset, TORs will be agreed with IOM team through sharing and feedback and this will allow to develop broad modalities of carrying out the study were discussed and agreed upon.

Methodology:

The study will be mainly based on primary data analysis through set of guiding questions applied in focus group discussions, key informants interviews and using rapid market appraisal techniques. Further, Qualitative information will be collected through documents review, opportunity sampling and field observations. At the same time, secondary data analysis will be carried out by using latest available Agricultural and Livestock Statistics of Pakistan 2006-07.

The methodology thus was comprised of the following phases:

- Structuring of guiding questions;
- Review of Documents (Secondary Data Review and Analysis)
- Qualitative Information Collection
- Data analysis
- Quantitative analysis and findings formulation
- Report Writing

Review of Documents

The purpose of the documents review was to adequately comprehend the status of dairy industry in Lodhran district (Tehsils Kehroor Pacca) including type and number of livestock; past, present and planned initiatives related to dairy sector development, role of public and private sector institutions, nature and type of support services, policy and regulatory environment, development incentives, etc.

Qualitative Information Collection

The team used the following techniques for collecting qualitative information:

- Focus Group Discussions

- In-depth Interviews
- Personal observations

The study team developed clear guidelines for all these techniques, including:

- Overview of the assignment
- Mode of addressing the communities and government officials
- Explaining project background and its future impact
- Method of asking questions
- Complete understanding of each of the terms employed
- Practice reading questionnaires to be used during field survey
- Detailed instructions on procedures and questionnaires
- Method of recording responses and discussions
- Editing of the information

Field Work Planning and Execution, Data Entry and Analysis

The field visit plan was discussed with the IOM teams and District/Tehsil officials of Livestock Department posted at Lodhran who also directly participated in the data collection exercise. Field data collectors/enumerators were hired locally to support SCI team who were well versed with the subject and the area, and also understood local language and social set up. In addition, the data collectors/enumerators were imparted training in data collection techniques and how to maintain its quality and reliability. The required technical support was also obtained from the District and Tehsil Officers of the Livestock Department. SCI has hired a technical expert to support the data analysis and report writing process.

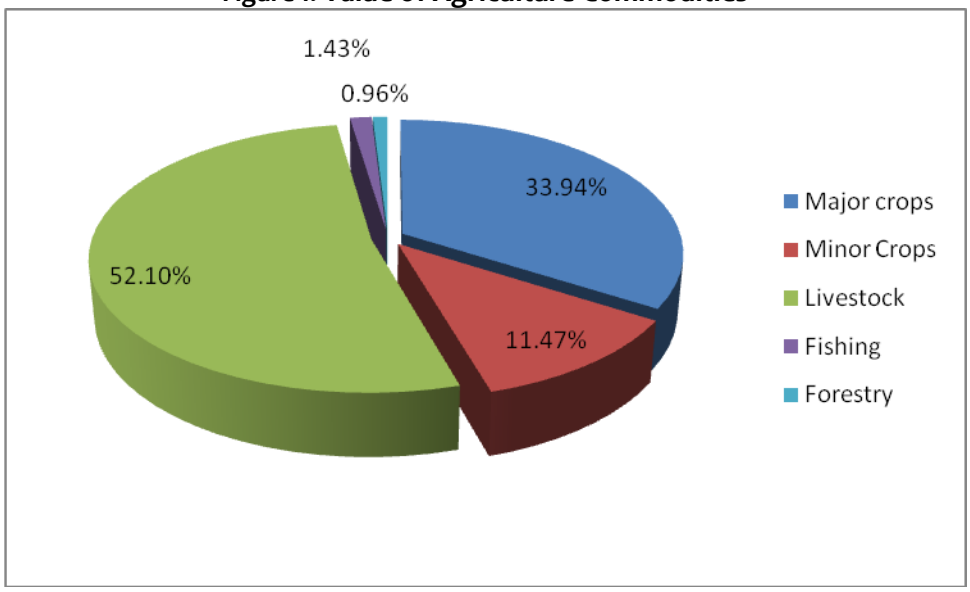
FINDINGS:

Role of Livestock in Pakistan Economy

Notwithstanding its declining share in GDP, agriculture is still the single largest sector, contributing 21% to GDP and employing 44% of the workforce. More than two-third of Pakistan's population lives in rural areas and their livelihood continues to revolve around agriculture and allied activities. Like in other developing countries, poverty in Pakistan is largely a rural phenomenon; therefore, development of agriculture will be a principal vehicle for alleviating rural poverty. Empirical evidence suggests that higher growth in agriculture on a sustained basis had a lasting impact on poverty reduction in Asia in the 1970s and the 1980's. In later decades the impact of agriculture on poverty reduction became weaker as the Asian countries in general, and South Asia in particular, began to witness productivity gains stagnating on account of structural issues, including limited investment in research and extension services. The recent global food crises, while creating difficulties for net food importing countries, is equally providing opportunities for developing countries like Pakistan to develop strategies that benefit from the current situation by giving more serious attention to agriculture (Pakistan Economic Survey 2007-08).

Livestock plays an important role in the national economy. It contributes 11.2% to GDP. Its share in the value of all agricultural commodities is 52.10% (Figure 1):

Figure 1: Value of Agriculture Commodities

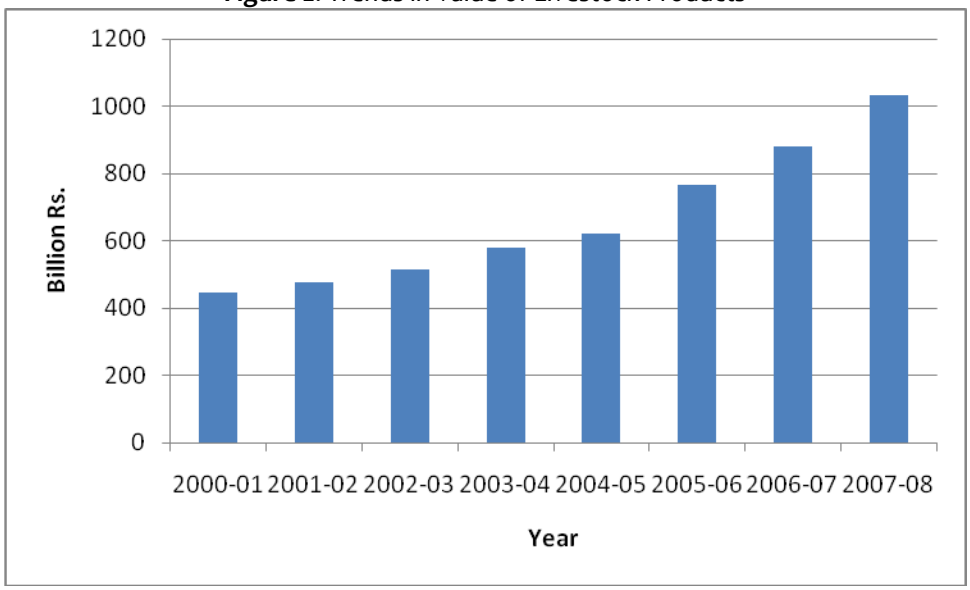


Source: Pakistan Economic Survey 2007-08

Figure 1 clearly shows that livestock alone contributes more than all others combined including crops, fisheries & forestry towards the value of agricultural commodities.

The statistics reveal that value of livestock products has witnessed a constant increase over the past one decade (Figure 2):

Figure 2: Trends in Value of Livestock Products



Source: Pakistan Economic Survey 2007-08

Figure 2 shows that value of livestock products increased from Rs.446.058 billion in 2000-01 to Rs.1031.858 billion in 2007-08 thus showing an increase of 131.33%.

Livestock is one of the major sources of livelihood for small marginalized and landless stockowners. Over 8 million families are directly involved with production and marketing of livestock. Several products from livestock are part of the food basket and a source of high quality nutrients.

Overview of Dairy Sub-sector

In spite of their diminishing share, milk and milk products continue to be an integral part of daily food basket in Pakistan in general and in rural areas in particular. Milk is generally consumed as fresh, boiled, powdered and processed (UHT, Pasteurized). The common milk products are yogurt, butter, ghee, ice cream, cheese and confectionaries. According to Agricultural Statistics of Pakistan 2006-07, production of gross as well as milk available for human consumption has increased over time (Figure 3):

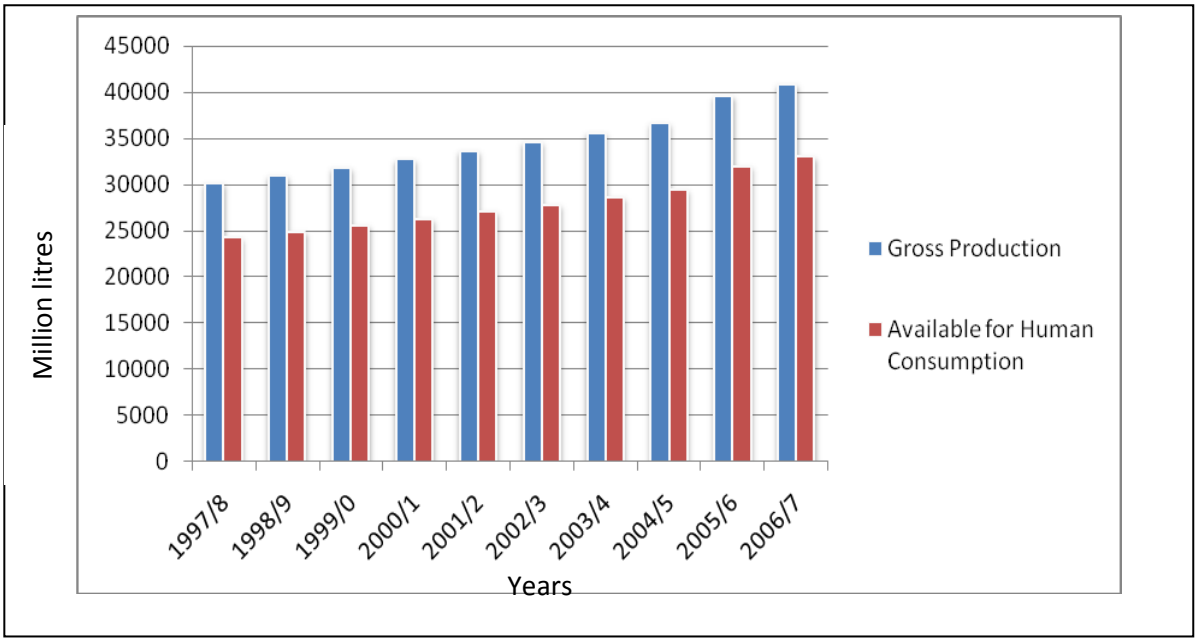


Figure 3: Trends in Milk Production and Availability for Consumption in Pakistan

The gross milk production increased from 30126 million litres in 1997-98 to 40872 million litres in 2006-07 thus showing an increase of 35.7% over a period of nine years. Similarly, milk available for human consumption during the same period increased from 24,215 million liters 32,996 million litres thus showing an increase of 36.3%.

Province-wise data revealed that Punjab with 20.79 billion litres (63%) was leading in milk production followed by Sindh 7.59 billion liters (23%), NWFP 3.96 (12%) and Baluchistan 0.66 billion liters (2%).

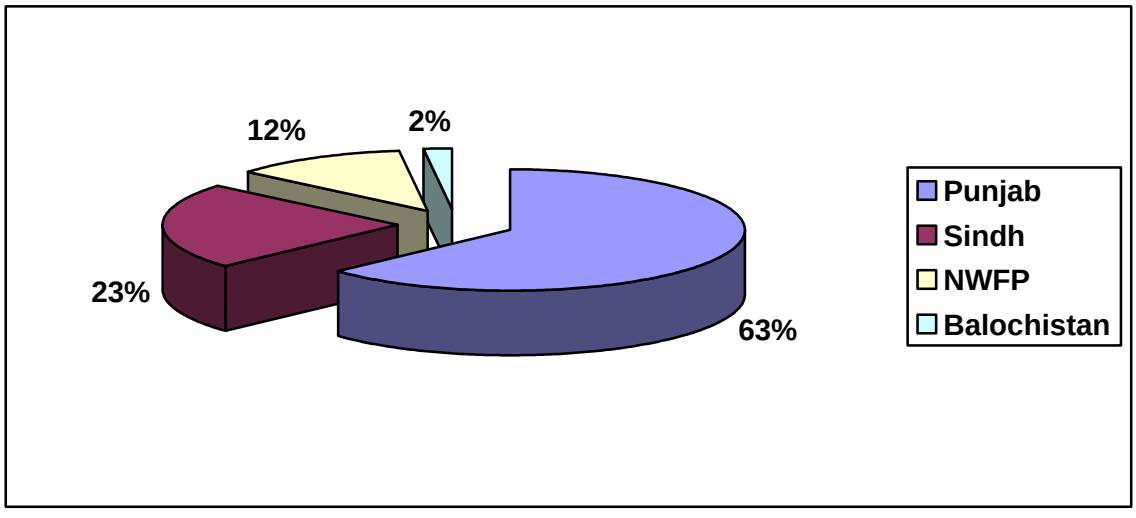


Figure 4: Provincial Share in National Milk Production

Statistics further showed that buffalo milk contributed 64.7% in national milk production followed by cow milk 34.4%. Milk from goats, sheep and camels together contributed 0.9%. However, milk production from cows increased at a pace faster than buffalo. Milk production from cows increased from 9.36 billion litres in 1996 to 13.33 billion litres in 2006, an increase of 42%. Milk production from buffaloes during the same period increased from 18.90 billion to 25.04 billion litres thus showing an increase of 33%.

There is distinct consumer preference for buffalo milk mainly because of high fat contents (6-8%). This is also very attractive for the dairy processors who offer milk with 3.5% fat contents. There are 8 million farming households in Pakistan with a total of about 50 million animals. The number of animals in Pakistan is thinly spread across thousands of square kilometers with an average of 2 to 5 animals per household. Farming practices are also very old and traditional and thus need a lot of improvement. Nevertheless, the share of rural milk producers in national production of 33 billion liters is as high as 71%. The remaining 29% comprises of peri-urban and urban producers' share. Of the total milk produced, 97% is in the informal sector (i.e. loose milk consumed in the villages and or sold in the cities through "*doodhis*" in unhygienic conditions and without any quality standards). Only 3% milk is processed and marketed through formal channels. However, in spite of only a small percentage (3%) of milk being processed, the (UHT) market is growing.

There are 24 units processing fresh as well as dry milk in private and corporate sector in the country. The total estimated installed processing capacity is 2.42 billion liter per annum. The major dairy processing companies include Nestle, Nirala, Halla, Noon, Milac, Dairy Bell, Dairy Crest, Premier, Haleeb, Prime, K&K, Engro and Pak Army. The industry is mainly concentrated in Punjab. Dairy industry processed about one billion liters of fresh milk of buffalo and cow and 12.5 million kg of dry milk during the year 2005-06. Dairy industry is producing various products namely: UHT, Low fat, High fat, Pasteurized, flavored, Powder and Condensed milk, cream, Yogurt and Butter (GOP 2007).

Although the capacity of the major players in the industry has increased over time, yet a huge gap was found in the full capacity and actual processing. When averaged for both flush (70-80%) and lean (30-40%) period, the industry was running at its half of the capacity for whole year. The expansion of processing capacity and new entries like Engro has increased competition in the processing industry. The wet market (fresh milk market) is also giving a tough competition to the industry. Resultantly the milk prices are increasing even in the remote areas.

The purchase price of milk ranges from Rs.21 to 25/liter for 14 total solids (TS) or 6% fat. The average price received by farmers for their milk (cow, mix and buffalo) ranges from Rs.19 to 23/liter after adjusting for TS. The informal system is also purchasing on a competitive price and providing services in the form of advance payments to the farmers.

Structure of Dairy Farming in Punjab

The dairy farming is predominantly in the hands of small and landless farmers. The livestock farmers can be classified as small (small-subsistence with 1-2 animals and semi-subsistence with 3-4 animals), medium (having 5-10 animals) and large (commercial with 11-20 animals and market oriented with 21 or more animals). Based on this categorization[1], households falling in the category of small farms constitute about 85.4% (Figure 5):

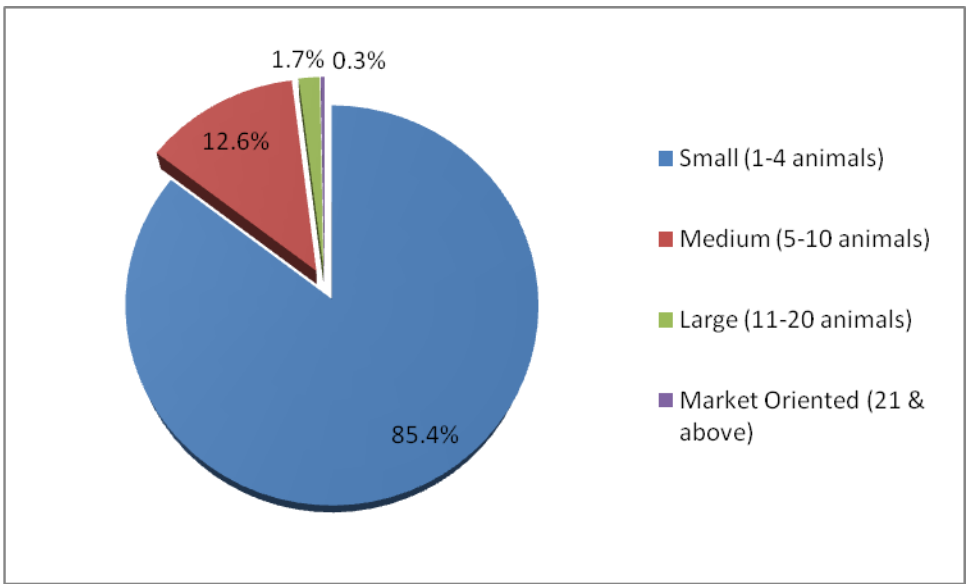


Figure 5: Milking Animal Farms Classified by Size of Herd in Punjab 2006

LIVESTOCK (DAIRY) PRODUCTION SYSTEMS IN PROJECT AREA

The livestock production system is subsistence type but semi commercial units are emerging. According to Livestock Census 2006, the dairy farming in Lodhran District is dominated by small holders. The farms falling in the category of small herd (1-4 animals) constituted 87.9% and were higher than in Punjab.

Fodder and compound feeds are available. However, there have been radical changes in the crop rotation during the last five years. Recent spot checks and appraisals indicated drop in the fodder production area since most of it went for wheat production due to revised wheat rates. Meetings with stakeholders indicated increased interest of the farming communities in livestock production particularly milk and byproducts.

The analysis of sampled survey showed that the animal herd maintained by a household comprised of a mixture of buffaloes, cow and sheep/goats. In addition, poultry and other animals especially

[1] Source: Livestock Statistics 2006, Punjab Province, Agriculture Census Organization, Statistics Division, Government of Pakistan

pack animals were also part of the farming system. However, buffalo ad cows were almost exclusive source of milk.

The respondents were mostly reluctant to provide information about their incomes. The absence of written records further compounded the problem. However, agriculture and livestock were reported as main sources of household income, supported by off farm activities including employment in public and private sectors. They further opined that livestock was becoming priority and hence gaining more significance in farming system because of its growing role in generating cash income for the family.

Livestock Production Systems in Punjab and Project Area

Punjab has diverse agro-ecological zones. The classification is based on the climatic regimes and the agricultural activities. The total area of the province is 20.63 million ha with a population density of 359 persons per sq. km. It is unique due to a well-developed canal irrigation system, which traverses through this region from various rivers.

District Lodhran falls in Cotton Wheat Zone along with Multan, Khanewal, Bahawalpur, Bahawalnagar, Pakpattan, Muzaffargarh, Rahim Yar Khan and part of DG Khan. The population of livestock is: Buffaloes-0.6; Cattle 0.34; Sheep 0.10; Goats 0.64 and others (mules, asses and horses) 0.034 million. The major crop rotation is cotton- wheat-cotton. All Other crops are also grown in varying quantities. Sunflower, vegetables and melons are becoming important part of the crop rotation. The livestock production system is subsistence type but semi commercial units are emerging. There is well developed milk marketing system and all the major processing units and collectors have collection system in larger part of this zone. The urban markets are developing fast and the market chains are using improved equipment with better hygienic conditions and quality products. Fodder and compound feeds are abundantly available. However, there have been radical changes in the crop rotation during the last five years. Recent spot checks and appraisals indicated drop in the fodder production area since most of it went for wheat production due to revised wheat rates.

Buffalo Production Systems: Buffalo still produces over 60% of the national milk production. A significant population (42.6%) is maintained in very small herds comprising of 1-4 animals. Another 37% of the buffaloes are raised in units of 5-10 animals. The medium sized herds (17.3%) consist of 10 to 30 animals. Only 3.1% buffaloes are kept in herds of over 30 animals and these are mostly peri-urban.

Rural Smallholder Subsistence Production System: Still over 60% buffaloes are maintained under this system. Farmers keep 1-2 buffaloes in milk with a heifer or a young calf. The farmers grow some fodder and graze the animals on field bunds/road sides or canal banks. Depending on the location and access, part of the milk is sold. Larger part of the production is consumed as raw milk or converted to ghee. The average lactation yield is around 1200 liters. Women play important role in raising these animals.

In the last two decades due to infrastructure development, the subsistence production is changing into market oriented production system in larger part of Punjab. The herd size is increasing but 5-7 are mostly present in the herd. These animals are stall fed with some seasonal grazing and supplemented with concentrates. The management of these herds is better and average production ranges from 1800 to 2000 liters. Over 50% of the milk is marketed mainly through middlemen who collect it from the farm gate.

Rural Commercial Production System: This system has developed during the last 25-30 years when some milk processing plants were installed. The herd size is 30 or more animals most of which are lactating. Most of the milk is sold. The management of such herds is better than foregoing systems. Feeding is based on grown or purchased fodder. Home mixed concentrates consist of cotton seed cake, wheat bran, milling by-products. Mineral mixes are also used by majority of the farmers. The buffaloes kept under this system produce from 2000 to 2500 liters of milk. The family labor is supplemented with hired labour.

Urban and Peri-Urban Production System: These units also emerged as the demand of milk and byproducts grew. Recently Lodhran has become important milk shed in Punjab. Depending on the location in a small or big town the number of animals kept varies. Mostly 10 to 50 lactating buffaloes producing up to 2500 liters of milk per animal form such herds. Since almost all of milk produced is sold at comparatively higher price, the farmers afford better management to these animals. The stall feeding consists of green fodder, straw and home mixed concentrates. Good quality concentrate feed is readily available. In cities like Lodhran, Kehroor Pacca, Mailsi and comparatively bigger villages, commercial herds are expanding fast.

Cattle Production System: In the subsistence production systems cattle were quite important as dual-purpose animals for milk and draught. As the mechanization was introduced the importance of draught animals diminished. At the same time exotic blood was being introduced. With this the share of cow in national milk production has slightly increased. At present the contribution of cow's milk is around 29%.

The herd size varies and over 55% of the cattle are kept in units of 1-6 animals. Twenty per cent fall in the range of 7 to 10 animals. About 20% fall in range of 11 to 30 animals. About 5.4% of the cattle population falls in the range of over 30 animals.

Progressive Farmers Production System: During the last two to three decades there was importation of pure bred cows as well as of semen from abroad. This triggered crossbreeding mostly using Sahiwal and Red Sindhi cows. The milk production was doubled. The unit size is 20 to 30 cows. The estimated number of these animals is over 2.0 million. These animals are raised under good management. The green fodder is supplemented with concentrates. Introduction of exotic blood has resulted in increased lactation yield (2200 to 2600 liters), improved age at first calving and better breeding efficiency. Lodhran is becoming an important district where such units are emerging fast.

Small Ruminants Production Systems: The small ruminants are raised for mutton wool, skin and hair production. Most of the sheep breeds, produce carpet wool. The major sheep breed is Lohi. Teddy, Beetal and their crosses are goat breeds. Beetal breed is excellent for milk production and males are raised for special occasion such as Eid-ul-Azha. Landless and smallholders keep 1-2 Beetal goats to meet the family milk requirements. The off springs are sold at fairly high prices, raised and fed for special occasions.

The flock size for sheep and goats varies. About 45.1% goat flocks consist of upto 15 animals. Only 12.4% sheep flocks fall in this group. Over 30% of sheep and goat population is kept in medium sized flocks ranging from 15 to 75. A significantly higher percentage (51.9%) flocks have more than 75 sheep whereas only 23.1% goats fall in this group.

Fodder and Feed

Fodder: Fodder production is an important part of the crop rotation in the district. Major part of the district is irrigated and suitable for production of fodder crops. The main winter fodders include *berseem*, brassica species, turnips and oats. Few farmers grow lucerne for feeding mostly to horses. Maize is grown both in early winter and spring for grain and fodder. The summer fodders are sorghum, millets, maize, mott grass and multi-cut sorghum introduced in the past one decade. Few farmers grow a mixture of sorghum, millet and leguminous moth varieties.

Sunflower leaves are mostly fed to small ruminants. Dried maize, sorghum and millets are staked for winter feeding. These are mixed with small quantities of *berseem*, mustard (*sarson*) or turnips. Sugar-cane tops are also fed to large ruminants in winter. In spite of fairly large area (range 14-17%) under fodder, still seasonal shortages are observed for two periods during the year. The first period is early winter that starts from mid November and lasts till mid February. The second crunch period starts in May when *berseem* growth stops. This period will run till early July when summer fodder becomes available. The reason for this gap is that farmers do not allocate separate area for fodder and wait till wheat harvest in April/May. The summer fodder thus grown will not be mature for feeding after *berseem* growth is retarded/stopped in April/May. Similarly, the winter fodder (*berseem*, oats, brassica) are sown after harvesting cotton and other crops causing a winter shortage. Farmers have also limited access to better varieties and cultural practices often are too inadequate to have a year around fodder supply. Since livestock is an important source of farm income, farmers must adjust the periods of sowing, acquire and sow high yielding varieties and improve production practices.

Feeding of the non-lactating animals always gets a cursory attention. Consequently the age at first calving was reported at 60 months in buffalo. Under better management the same is around 48-52 months. In a lifetime production cycle there will be fewer lactations and less production. The calving interval in well fed buffalo herds is 15-16 months. In Lodhran farmers reported it to be around 23-27 months. Similar observations were recorded by Idara-e-Kissan in Pattoki area. The farmers have to bear the costs on feeding of these animals during unproductive phases too. This puts in enormous pressure on the dwindling feed resources.

There is also no awareness about conservation of the seasonal surpluses of fodder. Most of the stalks or hay is stored outside apt to severe leaching by sun and rain.

Supplementary Feeds: Good production cannot be sustained without supplementary feeding. The district has easy access to concentrates and raw material for home mixing. The quality of ingredients over time has deteriorated immensely. Cotton seed cake which is one of the preferred and major feed ingredients is usually highly toxic stuff. The crude protein seldom exceeds 10%. A recent report indicates that high percentage of urea was incorporated in the compound feed to increase the protein contents by overlooking the harmful effects. The information gathered from the farmers and field staff of Livestock and Dairy Department during field visits to the project area (Kehroor Pacca in Lodhrana) exhibited that cost of *wanda* has tremendously increased and became almost unaffordable. On the other hand its quality has also deteriorated. Barring a few exception most of the *wanda* available in different brands was adulterated and mixed with inferior and even toxic ingredients.

Farmers producing crops like maize, sorghum and millets can prepare cheap concentrates for dairy animals. Ground maize, millets and sorghum can be mixed with wheat bran/dry bread *(roti)* and left over wheat and other grains. If sugar-cane molasses (home produced) is mixed with into it, all the requirements of nutrients can be easily met. Even in developed countries, single grain feeding is still in practice and is a cheap and simple source of keeping livestock healthy and more productive.

The analysis of the data collected during the sampled survey showed that both homemade and commercially available concentrates were fed to the animals. The daily feeding was reported at 2.2 kg per wet animal. Of this around 25% was homemade and the remaining 75% purchased from the market. The level of concentrates feeding is also low and thus a factor directly contributing towards low milk production.

Livestock Diseases

The district is home to several livestock diseases of viral, bacterial, nutritional and parasitic origins. In the area bordering with river *Sutlej* sporadic cases of *haemorrhagic spticaemia,* foot and mouth, and red water diseases are commonly observed. Vaccination against *haemorrhagic spticaemia* and foot and mouth diseases is regularly done but still a large number of farmers have a limited access to vaccine.

Mineral deficiencies are quite pronounced in lactating, dry stock and young growing animals. The Livestock and Dairy Development Department Lodhran District reported the occurrence of red water and milk fever, both related to mineral deficiencies. Both ecto and endo parasites (ticks, mange mites, round & tape worms) are commonly observed in livestock. Progarmmes for eradication do cover a fraction of the livestock.

Farmers Associations/Cooperatives

Currently the farming communities are not organized in groups. Consequently they had no power as bargaining agents for their produce. Milk production and collection, which is comparatively more organized as compared to other livestock products, have no milk producers' association. Some of the milk collectors have started organizing farmers in groups. Thus they are at the mercy of collectors, big or small.

ISSUES & CONSTRAINTS:

The following overriding constraints limit the livestock productivity

Improper breeding services: There is an overall shortage of breeding services in the whole country but some pockets have severe deficiency of breeding bulls/rams/bucks. An extensive survey conducted by Qureshi (2003) indicated that in several districts of Punjab the breeding bull to female ratio is1:276. It was also noted that the male being used might not even be classified as breeding bulls. This has led to overall low productivity of the stock due to long calving intervals and short lactations. Similarly the breeding of small ruminants is not proper. The shortage of breeding services leaves open ground for untrained professionals to resort to evil practices.

Subsistence Production System: Under subsistence production system, farmers have limited access to inputs required for exploitation of the genetic potential. There is marginal benefit of production. In most parts of the country the dispersal of livestock is so thin that access to services becomes impossible. The meat available in the markets is also sold on quantity rather than quality, so there are no incentives currently for value addition of the products.

Inadequate Fodder Production: The overall situation of fodder production is not satisfactory in the country. Fodder production has never received priority in any planning and improvement programme. In spite of the fact that fodder is grown on 14-15% of the area, here are severe seasonal shortages both in summer and winter. These seasonal crunches negatively impact the livestock output. The buffaloes are at the peak of milk production when the winter shortage starts.

Supplementary Feeds: Supplementary feeds are essential for maintaining the animal nutritional requirements and also animal productivity especially milk yield. The herders reported daily use of concentrates at 3 kg which is quite low. During the survey, it was found that quality of feed available in the market is poor. There is significant element of adulteration with highly toxic stuff. Also, they are very expensive. This almost prevents the use of feeds and thus directly impact animal productivity. As mentioned earlier, a recent report indicated that high percentage of urea was incorporated in the compound feed to increase the protein contents without overlooking the harmful effects.

Institutional Weaknesses: The institutes conducting research on various aspects of production are not properly geared to undertake it. The research agenda of the institutes also completely overlooks problem-oriented research since there is no feedback from the farmers. The regional importance of

the livestock also gets cursory attention. There is also no mechanism for undertaking adaptive research. Similarly the Cholistan livestock has received very little attention. Genetic potential of most of the breeds has not been documented on scientific lines.

Technology Transfer: The technologies generated do not reach the stakeholders well in time. Also there is no system of revalidation of the technologies with the changing conditions. The present extension system attends to animal health aspects only and has no mechanism for transfer of production technologies at grass root level.

Extension Services: There are variations and gaps in the provision of extension services. The extension services only cover less than 30% of the livestock population. The logistic arrangements with the department are limited. The hospitals and other service providing agencies are located far away from the production centers. Extension workers stay away from the remote areas. The field staff had apprehensions against devolved services.

The quacks are filling the gap and generally add to farmer's problems through in appropriate knowledge and unscrupulous practices.

Inadequate Human Resource Development: There is no system of imparting adequate hands-on training skills at neither the grass root level nor any arrangement for post degree refresher courses and updating the skills of middle level workers. Livestock production activities revolve around women and children who use their local knowledge to redress issues. It is also, under the prevailing social system, difficult to reach this important segment. Despite a growing awareness to reach women farmers, extension services are still skewed towards males.

Policy Implications: The existing policies for price fixation and capping are not supportive to the farmers and therefore, they stick to outdated methods of production. Quality control measures have not been implemented for the livestock and products. Since there is no incentive for improved quality, farmers continue to produce whatever stuff they can.

The budgetary allocations to the livestock sector are very low and there are very limited funds for development expenditure. Larger part of the budget allocation is spent on salaries with poor maintenance of existing infrastructure.

Access to Credit: Access to credit is limited with cumbersome procedures. The information collected from different stakeholders indicated that high mar up rates, misuse of credit, lengthy procedures, lack of collateral prevented small holders' access to credit. Under the given circumstances, Zarai Taraqiatee Bank Limited (ZTBL) was considered comparatively better option due to comparatively lower rate of mark up (9%) which further reduced to 8% in case of those farmers who repaid as per schedule and did not default. However, the maximum limit of Rs.40,000/- was only sufficient for production loans and hardly supported any plans for purchase of milking animals. The ZTBL has entered into arrangements with Nestle and Pakistan Dairy Development Company for extending credit but that too was limited to farmers working with Nestle and areas where PDDC was active.

This state of affairs forced the potential users to rely on informal credit which apart from being more expensive has decreased under the growing economic crisis.

Women who perform major livestock production activities have limited access to credit. A large chunk of landless livestock farmers (particularly women) were always kept at bay from availing this facility since the procedures required agricultural pass books which are only issued to persons owning agricultural land.

Fragmented ownership and dispersed population: In several parts of the country, the fragmentation of land and dispersed units has affected the livestock sector since inputs are not available. Secondly, the outputs cannot be marketed due to far-flung areas with poor collection system.

Landless livestock farmers and agricultural labour: The landless share croppers and labourers owning livestock are under severe economic pressure. Most of these people are under heavy debt to the landlords.

Scale Issues: Lack of group/collective actions in the absence of cooperatives and associations, prevent from the benefits of economies of scale including farmers bargaining power vis-à-vis traders

Shaken Confidence in Public Sector Organizations: Over time people have lost faith in the public sector organizations. During focal group discussions in Lodhran, farmers pointed out that there are huge gaps in service delivery. Livestock or agricultural extension services mostly revolve around big farmers.

LIVESTOCK (DAIRY) MARKETING SYSTEMS

Milk production in rural areas constituted about 80% of the total milk production in the country. Of the remaining 20%, peri-urban production accounts for about 15% and the urban about 5%. About 90% of the milk marketed is collected from the subsistence farmers and the remaining 10% is contributed by the commercial dairy farms. The situation in Lodhran District has been reported more or the same.

Milk Production and Supply

Milk is the largest product of livestock sector, which accounts for 60% of the total value of livestock produce. Only 20-25% of the total milk output is channeled into the urban marketing system. Small dairy farmers account for 80 percent of the marketed milk. With the increase of milk prices and pressurized by higher cost of production even small-scale milk producers sell part of their milk after their household consumption. The family's decision to sell milk, and the amount to sell, is clearly poverty driven. Small farmers sell milk only because they have no other source of cash income (Ali 2007).

With high population growth, urbanization, income growth and diversification of diet towards high value agricultural products, per capita milk consumption has increased from 51 litres per annum to 211 litres per annum. The estimated urban demand for liquid milk equivalents for Pakistan is 11.35 billion litres; estimated market demand for all Pakistan was 33.76 billion litres in 2007. In dairy items,

fresh milk in bulk form, packed UHT milk and yogurt are major dairy consumption items. The dairy industry in Pakistan is underutilized. At present it is working to about 50 percent of installed capacity with total processing of only 2-3% of milk produced in the country. The preference for raw milk throughout Pakistan is based on consideration of good quality, taste and affordability (Sharif et al 2007).

The analysis of sampled survey showed that 70-75% milk produced by a household was sold. It further transpired from the information collected through survey and focus group that over the time retention of milk for home has decreased. This partly attributed to increasing need for cash for meeting household expenditure and partly to growing commercialism. Opportunities for disposal of milk have increased due to entry of milk processors and improvement in rural infrastructure (access roads) and collection system (chillers).

The survey further revealed that consumption of tea increased and replaced milk partly due to economic constraints and partly due to change in consumption pattern. The children in the family of course were priority for milk consumption. However, there was clear discrimination between male and female children. The former enjoyed priority over the latter. The diminishing use of whole milk obviously adversely impacted the nutritional intake and as a consequence health of the children.

The survey was timed when milk animals' production season was tapering off. Therefore, the information collected about per animal milk yield depicted the current status instead of averages in spite of sensitizing the enumerators in pre-survey training. The information collected through meetings with the stakeholders indicated that yield levels varied from farm to farm. The majority farmers with average management were able to get yield at 6-8 litres per day. There were very few farmers who applied improved practices including feed, fodder, health cover, etc who in turn were able to obtain good yields ranging from 12 to 16 litres. According to the experts and information disclosed by Nestle and Dairy Pakistan, yield levels of 10-12 litres were attainable by improving management practices (fodder, feed, watering, health cover, etc). This 4 litres increase in milk yield alone can add 1,067,406 litres per day in Lodhran district.

Production of milk falls to 55% of peak production at its lowest point in mid-June, while the demand increases 60% during this time compared to December when the milk supply is ample. The huge difference between lean and flush seasons is a significant problem. During the lean season, when the availability of the milk is very limited, the price goes up. During lean periods there is insufficient milk on the market and some of the processors have to close down their factories. The raw milk quality is not good and that makes the shelf life of the packed milk very limited. Farmers have adjusted their calving patterns for the lowest cost production and hence concentrate calving for winter milking. Counter cyclically, dairy consumption increases during summer with higher consumption of yogurt, ice cream, and other refreshing dairy products.

The seasonal fluctuation in milk production occurs due to lower water and fodder availability, and importantly the predominance of buffaloes in the herd. A good combination of buffalo and cow in dairy herds can partially help in reducing seasonal supply demand gaps.

The information gathered from the field was in line with the foresaid analysis. Milk supply was more in winter and less in summer. The first (January-March) and last (October-December) quarters of a calendar year represented peak supply period and third (April-June) and fourth (July-September) quarters represented lean supply period. This could be smoothened by improving access to fodder. Fodder crops are needed to be incorporated into the crop rotation and land assigned to fodders contrary to the existing practice of sowing fodder after wheat and cotton harvests. This practice delayed fodder maturity and in turn reduced availability of fodder to animals at critical periods of production (for instance, peak calving of buffaloes from July to mid September coincided with shortage of summer fodder).

Milk Marketing Infrastructure

The usual concept of organized markets is not prevalent in the case of milk. In other words, no markets for milk exist like food-grain markets, fruit and vegetable markets or even livestock markets. The marketing system for milk is predominantly informal an is characterized by the presence of a number of small sized farmers, milkmen *(doodhis)*, milk processors, milk/dairy shops, vendors or *halwais* operating at different stages of milk collection and distribution. The milkmen or *doodhis* are the main intermediaries linking milk farmers in rural areas with consumers in urban centers. The milk is handled in crude way. A typical *dhodhi* owns a few metallic containers/cans or plastic drums. The *dodhis* transport milk in these containers to shop keepers or *khoya* makers who maintain a set of boiling pans, buckets and earthen pot for making yogurt.

A large number of *dodhis* are operating in Lodhran. The information collected through different sources revealed that their number might be in hundreds. However, there exact number could not be ascertained.

The milk processors have introduced an organized system of milk collection. They have introduced chillers and refrigerated carriers. These initiatives have been supplemented by Dairy Pakistan under the Ministry of Production, Industries and Special Initiatives, and Livestock and Dairy Development Board under the Ministry of Food, Agriculture and Livestock. Milk processors, especially Nestle and Halla have set up collection centres in milk production areas where they have created basic infrastructure in the form of chillers. The milk collected at these chillers (Nestle calls them as Village Milk Collection Centres) is transported to sub-centres and processing plants in refrigerated carriers. This has provided competition to the traditional milk collection system dominated by *dodhis* and has thus enabled rural farmers to obtain better prices.

Milk Marketing Chain

The milk marketing (value/supply) chain is characterized by the presence of a number of middlemen or intermediaries operating at different stages along the distribution chain. Table 12 briefly describes types of players operating in the value/supply chain:

Economic Agents Involved in Milk Marketing Chain

Market Player	Description
Milk Producers	Rural subsistence farmers, rural market oriented farmers, commercial dairy farmers, & city and peri-urban milk producers
Milk Collectors	*Doodhis*, village milk collection centers, contractors, mini-supplier and dairy cooperatives (Halla)
Milk Processors & Manufacturers of Milk Products	Decreamers, khoya makers, confectioners, pasteurizing plants, UHT milk plants, conversion to ghee by farmers & others
Milk Retailers	Milk shops, peri-urban farmers-cum-doodhis, traditional dodhis, rural subsistence and market oriented farmers, retail shops
Milk Consumers	Consumers of fresh milk direct from farmers, consumers of gawala milk, consumers of fresh milk from milk shops, consumers of open pasteurized milk, consumers of pasteurized tetra pack, consumers of UHT poly/tetra pack

The above supply/value chain players are briefly defined below:

Producers: Dairy farmers are the sole point of milk production. They can be classified into two basic categories determined by the farm's geographical location and size of operations:

i. **Subsistent Farmers:** Constitute the majority of dairy farmers in the country and are responsible for 90% of the milk produced. They normally keep 2-5 milk producing animals on the farm.
ii. **Market Oriented or Commercial Farmers:** They are responsible for the remaining 10% of the milk production and keep anywhere from 10 to 500 milk producing animals on the farm.

Milk Collectors: For a majority of dairy farmers in the country, milk collectors usually provide the only market linkages. Based on the scale of their operations, milk collectors can be classified into five main groups:

i. ***Doodhis:*** They are primary and traditional milk collectors. Doodhis collect milk from farmers' doorstep. The collected milk is usually sold to urban consumers at their door step, retailers, mini-milk collectors and milk collection centres of the processing plants.
ii. **Mini Milk Collectors:** They collect milk at their established points mainly from *dodhis*, aggregate and supply to processing plant.
iii. **Contractors:** Contractors are large scale milk collectors and after purchasing milk in the bulk sell them directly to milk retail shops or dairy processors.
iv. **Village Milk Collection Centers (VMCC):** The VMCCs are set up by processing plants. Milk is collected from farmers, held in chillers (cooling tanks) and later transported to sub-centres.
v. **Milk Collection Sub Centres (SCs):** The SCs are also set up by the processing plants. The milk collected at VMCCS further is bulked at SCs and then shifted to processing plant in refrigerated carriers. The SCs have comparatively bigger chilling set up.

Milk Processors: The processors of can again be categorized into two types based on their scope and the products manufactured by them:

i) Traditional Processors: These are shops that process traditional dairy products to be sold locally. Products produced by them include ghee, lassi, yogurt, khoya, etc.

ii) Corporate Processors: These are national or multi-national companies that have well defined procurement and distribution mechanisms in place. They own processing plants and primarily produce UHT, Pasteurized, and Powder milk.

Milk Retailers: They run retail shops mostly in urban centers. They buy fresh milk at wholesale prices primarily from *dodhis* and sell to consumers. They also sell milk products like yogurt, *khoya,* confectionery, etc.

Consumers: Consumers are located in urban and rural areas. However, most milk marketed is consumed in urban centre. In addition, there are institutional consumers as well, e.g. hotels, cafeterias, hospitals, etc.

The analysis of household consumers (120) survey indicated that average monthly per household income ranged between Rs.4000 to Rs.65000 depending upon the source. However, majority fell in the income bracket of Rs.15000-25000. The average household income was about Rs.20000 per month. The survey further revealed that milk consumption was directly related to level of income i.e. higher the income more milk consumption and vice versa. The price of milk paid varied from Rs.25 to Rs.35 per litre.

The study showed that up to 70% milk was marketed through the traditional marketing channel dominated by the dodhis. The milk collected by the processing plants was 30%. Of the 30% milk collected by the processing plants, indirect collection through mini milk collectors or direct supplies from *dodhis* and farmers constituted 70%. The direct collection through village milk collection centres constituted the remaining 30%. The processing plants are gradually expanding their direct collection

system in order to minimize the risk of adulteration and spoilage during handling under normal conditions without chilling facilities.

Processed Milk Industry

The processed milk industry though with only 3% share is much better organized both in terms of milk collection system and quality. Milk collection system for processing sector varies from company to company. Broadly speaking it can be categorized into three groups: direct/self, indirect and contract. In Lodhran district, Nestle is the leading milk processor while others participation is insignificant. Nestle collected up to 30% milk for processing. Of this, 30% was collected directly from the farmers at village milk collection centres and the remaining 70% was collected indirectly through mini suppliers.

Direct Milk Collection System

The milk is collected from the farmers directly through a network of village milk collection centres (VMCCs) and sub-centres (SCs). The VMCCs are established by the company. The VMCC agent earns margin from the difference between purchase price and sale price. He also gets additional incentives on meeting the targets. Some companies pay commission to VMCC agent on milk volume. Milk is supplied by different farmers and VMCC in charge/agent is responsible to test and purchase milk according to the quality specifications prescribed by the company. Milk from the VMCC is transported by the company to the plant directly for processing.

According to Nestle criteria, sources of milk at VMCC or sub-centre include direct farmers (DF) who have small volume and bring milk at the VMCC or sub-centre. They get only base price. Second are progressive farmers (PF) who supply 20-40 liters of milk daily. They get price incentives (Rs.0.50/liter) above the base price. Those farmers who supply more than 40 liters milk per day are classified as Commercial Farmers (CF). Nestle also technically assists farmers to adopt best practices which ultimately results into improved milk production, quality and hygiene. Almost same classification is followed by Haleeb and Engro for farmers under direct collection system. CF supply milk at the VMCC and are also facilitated to get their milk collected directly from farm and partial advance payments. Incentives given by Nestle to CF included price premium of Rs.0.50/liter and an additional incentive of Rs.0.20/liter/practice on adoption of Nestlé's best farm practices. If the CF adopts eight best farm practices he will get price premium of Rs.1.60/liter. These eight best practices includes (1) free water access, (2) vaccination and De-worming, (3), balance feeding, (4) artificial insemination, (5) calf rearing system, (6) shed cleaning system, (7) record keeping, (8) farm mechanization.

Indirect Milk Collection System

Under the indirect milk collection system a third party is involved to collect and supply milk to the company. Main players involved in the indirect milk collection are *doodhis* and mini suppliers. *Doodhis* supply milk at VMCC and SCs and get the base price. The mini suppliers collect milk at their own collection points and company vehicle collects milk from their points after testing. Mostly mini

suppliers have only milk tanks without any chiller and use ice for getting it cool. They are given price margin above the prices being offered at VMCC of dairy company in that locality. Normally the mini suppliers offer similar prices and fat or TS criteria to the farmers like other VMCC in the area. However, the company has no bindings on the mini supplier regarding the purchase price from farmers.

Contract Milk Collection System

It is based on the contractual arrangements with some individuals who collect milk at their own (purchase from farmers, *dodhis*, mini suppliers etc) and supply milk to the industry (at its processing plant by own transport). They get higher prices (Rs.1-2.5/Liter) than prices paid to the farmers along with the allowance for transportation. Some contractors are also given milk tanks, chillers etc and partial advance payments.

Comparison of Milk Collection Sources

Milk processing industry has some advantages and disadvantages of collecting from different sources in relation to competition, price, ensured supply, quality, reliability, time to establish a system of milk collection and sustainability of the system. The industry has many positive aspects from direct milk collection from farmers as there is less competition (large number of small farmers) with minimum price and high quality milk. However, the volume available is very small resulting in higher cost of milk collection and small farmer could supply milk to any other competitor. Future of the industry relies on it as it is more sustainable and major share of the marketed milk comes from this source. Similarly progressive and commercial farmers offer little more competition by offering more and economical volumes and thus expect prices higher than the direct small farmers. The indirect sources also offer more competition and thus expect higher prices but they also pose issues of quality, reliability and sustainability. Figure 16 gives comparison of level of influence/impact of each factor in the existing milk supply chains.

Milk Collection Sources and their Comparison

Indicators	**Sources of Milk**					
	Direct Farmer	Progressive Farmer	Commercial Farmer	*Dodhi*	Mini supplier	Contractor
Competition	Low	Medium	High	High	Medium	Medium
Price	Min	Ave	High	Ave	Max	Max
Volume available	Min	Min	Ave	High	Max	Max
Quality	+++	+++	++++	++	??	??
Time to establish	Min	Ave	Max	Ave	Min	Min
Reliability	Ave	Ave	Ave	??	???	???
Sustainability	Max	Ave	Ave	??	--	--

Marketing Margins

Demand and supply are the main factors for determining/establishing the purchase price of milk in different milk producing areas. At farmers level the distance from the urban areas along with the infrastructure affects the price of milk. The presence of VMCC also affects the milk price due to higher milk demand and competition between the processing and wet market. However the price offered by the wet market is the major force behind the milk price offered at VMCC. The price of powder milk in the international market also plays its role in establishing the purchase price of milk by the industry.

The prices offered by different dairy industries remain almost same within same area. However, prices vary from area to area. Under the direct collection system price at the VMCC remained in the range of Rs.22 to 25/liter for 14 TS or 6% fat. The prices for contractors and mini suppliers involve additional incentives for services and transportation charges paid. The contractors and mini suppliers were getting Rs.1.00 to 2.0/liter higher than the prices offered to farmers.

In spite of efforts data information on costs and margins of the formal sector (processing industry) and even for the semi-commercial dairy farms could not be ascertained. However the difference in purchased price and sale price of UHT milk ranged from Rs.30 to 32 per liter. Past studies also revealed that margins in the formal sector in the UHT milk chain amounted to Rs.15 to 29 per litre fresh milk with 6% fat.

The processed milk value chain varied from the fresh firstly on account of collection through VMCs and mini suppliers or contractors and secondly milk processing which directly impacted margins and costs. The share of marketing agents in processed milk is illustrated in Figure 18:

Marketing Associations/Cooperatives

Currently the farming communities are not organized in groups. Consequently they had no power as bargaining agents for their produce. Milk production and collection, which is comparatively more organized as compared to other livestock products, have no milk farmer's association. Some of the milk collectors have started organizing farmers in groups.

Milk Marketing Associations and Cooperatives are non-existent in Lodhran District. In Pakistan Idara-e-Kissan (Halla) milk has demonstrated a successful model of milk cooperatives and survived in a growing competitive market environment, especially prompted by UHT milk processing plants.

In dairy the Halla (Idara-e-Kissan) is often cited as model in Pakistan. The project started in late 1980' as a public private partnership and is now self sustaining. The processing plant is located in Lahore while milk collection comes from Pattoki area (Chuchak) in district Kasur. Farmers are organized into groups comprising of 15 members (households). A member is obliged to supply 300 liters of milk in 90 days. A collection point is set up in the village. Milking is done at 0500-0600 hrs, milk aggregated and transported to the collection centre at Chuchak within 2-2.5 hours of milking. The village milk collector uses bike, motorbike or animal cart depending on location distance. The buying price at

centre is Rs.25 per litre for 6% fat. The village milk collector gets a margin of Rs.3 per litre, thus selling price for the farmer is Rs.22 per litre at village level. Generally 15 households form a village collection spot. At present the organization is working in 1200 villages.

Halla is also offering social services to the farmer families like health and education through Health, Education and Adult Literacy (HEAL) schools, vaccination campaigns for children, family planning services, goat programme for widows (income generation activity), etc.

The Livestock Dairy Development Board (LDDB) is also focusing on small and landless holders promoting group activities in order to create economies of scale both in procurement of inputs (bulk buying) and sale of milk (bulk selling). So far they have organized 60 dairy farmer groups i.e. 23 in Kasur, 17 in Mandi Bahauddin and 20 in Gujranwala districts. Members in a group vary from 20 to 30 farmers. The pre-condition is that the group members have to offer 400-500 litres milk daily form their own herds. The office bearers of the group include President, General Secretary and Treasurer who are elected by the group members. The group establishes and operates a joint account. The project provides chiller with generator set, milk quality testing kit, cash grants for feed, free technical support and health cover, capacity building of the members through short trainings in best practices, and facilitates market linkages.

Issues and Constraints

The Pakistan dairy industry faces multiple challenges – improving the lot of small farmers through improved productivity and enhanced profitability, improving rural infrastructure, significantly improving quality through the supply chain and to the final consumer, and potentially facing increased competition from international suppliers of dairy products. It is imperative to address the issues in order to develop dairy industry in the country. The system must guarantee quality, profitability and sustainability. It is believed that improved and demonstrated profitability will attract more investment in dairy farming and will thus solve the problem of shortage of milk.

Major effort is required to achieve the scale and cost competitiveness necessary to ensure continuity and sustainability, while at the same time the interests of the millions of smallholder farmers must be safeguarded, and a more prosperous future made available to them. Broadly speaking, the following are some of the more important problem areas:

1) The dairy farming is dominated by small holders who are widely dispersed and produce small marketable surpluses of milk. Milk collection under this situation and particularly in the absence of groups/associations/cooperatives becomes difficult and expensive. It also denies producers the benefits of economies of scale including improved bargaining power vis-à-vis marketing agents.

2) It is estimated that at present 20% milk is wasted, 15% in collection due to poor infrastructure and 5% due to calving which is quite significant and needs to be addressed. Marketing infrastructure especially access roads and cool chain system must be provided to facilitate milk collection from remote areas.

3) Milk collection still continues to be dominated by the traditional system of *dodhis* and contractors who do not have appropriate facilities for milk handling. The collection facilities established by the milk processors, Government initiatives of providing milk cooling tanks and chillers (PDDC & LDDB) and private initiatives in the form of semi-commercial dairy farms are appreciable but limited. These need to be expanded at a faster pace. At the same time technical and financial support for providing cooling tanks/chillers on the pattern of PDDC and LDDB should also be made available.

4) Milk adulteration is becoming a serious issue. This is mainly prompted by profiteering attitude of the marketing agents who aspire for windfall profits. There is need for creating mass awareness to exert social pressure and also taking strict regulatory course to curb it.

5) Marketing information system is non-existent. The milk farmers are at the mercy of marketing agents whose information/advice is dubious. There is thus need to install a market intelligence service which should meet needs of all stakeholders. This should be done by the Department of Agriculture (Economics & Marketing) which has been mandated for market intelligence of agricultural commodities.

6) The capping of prices by the district administration does not work and thus should be dispensed with.

7) Value addition is limited to yogurt, butter, ghee and ice cream. High value added products like cheese should be encouraged through training, technical assistance and access to technology and market. Women can play an important role in value added products. This will also have positive impact on their socio-economic conditions.

8) Access to credit is limited. The institutional credit network should be expanded. The procedures should be simplified and one window operation promoted. The existing credit limits should be reviewed and revised according to prevailing market conditions. The landless milk producers must be given loan against physical assets other than land and pass book issued accordingly. The facility of social collateral should also be considered.

9) Institutional support is very weak. All relevant institutions are working in isolation. There is no coordination mechanism. As a result there is duplication of activities at one place and absence at the other.

10) Poverty is largely a rural phenomenon. The increasing cost of living has adversely impacted food basket of a common man. The survey results showed that retention of milk for home consumption has decreased over time. This is mainly attributed to level of poverty. As a first step, there was a shift from milk consumption to tea. As a general practice males were the first priority and therefore its adverse impact was more pronounced in women and girl child leading to malnutrition and consequently being more prone to diseases. Milk being a major source of cash, any improvement in milk production and marketing will directly contribute towards sustainable livelihoods and will have a direct positive impact on rural women and children.

DAIRY DEVELOPMENT CONSTRAINTS AND OPPORTUNITIES

The dairy industry is back-bone of Pakistan's rural sector. About 80% of industry output is supplied by small-scale, semi-subsistence farming systems. Cash sales of milk are an important source of farm income but a large portion of farm output is retained for home use. Therefore, any improvement in their will yield high outputs and directly reduce the incidence of poverty which is a more pronounced in rural areas.

Milk yields per dairy animal per year are among the lowest in the world. This is attributable to various reasons such as poor fodder, genetics and long intervals between lactation. Along with the low milking yields there is a wide variation in milk yields between buffalo and cattle and between the different production systems. A major cause of the low yield performance is inadequate feeding. There are too many cattle for the available feed supply. Yield performance is likely to improve if farmers reduced their herd size and improved the feeding regime for the remaining animals. The alternative is to increase feed production which will require changes in cropping areas.

The issue of poverty alleviation for livestock producers primarily involves the financial performance of the semi-subsistence milk producers. Major constraints to improving farm income for these producers include poor milk yield per animal and low price received for milk because of infrastructure constraints and possibly capping on retail price of milk, the need or desire to retain milk for household consumption and ineffective and inadequate farm support services provided by provincial extension services notably animal health support.

The milk marketing system is underdeveloped by the standards of developed countries. It reflects the way the industry has developed under policy constraints. A developed marketing system based on milk collection and processing is emerging. However, it only accounts for around 2-3% of total milk utilization. The distribution system is mainly based around milk collectors operating as individuals or contracted groups distributing milk from a major producer. There are fundamental issues of food safety that must be addressed. Food safety regulations and hygiene standards are major areas of government policy intervention because of public health considerations. Reforms to existing regulations and effective compliance are neglected areas of government intervention.

Milk sales by the commercial sector are small and mostly involve UHT milk. There is some emergence of a market for fresh milk. The development of a commercial milk marketing system has been constrained by limited milk supplies available for collection. The integrity of the milk collection system in terms of hygiene and chilling a highly perishable commodity has adverse implications to the development of dairy industry.

The informal milk collection system dominates supply/value chain especially in remote rural areas. The traditional milk collectors are often the only sales channels available to rural producers. The marketing infrastructure available with this system is highly rudimentary involving at best the

motorbikes to carry milk cans. This however, under the given circumstances, appears to be the most efficient way of collecting milk from rural areas that are distantly located and lacking in access roads. The poor distribution infrastructure is a major constraint for developing alternative market outlets for producers in these areas. A perishable commodity like milk requires a good road network and a cold chain system that allows timely delivery to processing plants.

The lack of marketing associations/cooperatives for milk producers prevents them of the benefits of economies of scale. Producers of perishable products have limited market power in the price determination process. Marketing associations/cooperatives can strengthen the bargaining position of producers. Milk processing cooperatives (like Halla) would introduce more competition and provide alternative sales outlets for raw milk. It is the best way to maximize returns for producers and a viable alternative to domestic price support. However, successful cooperatives require expertise in marketing and distribution. They may also require an investment in milk drying to manage the seasonal peak in milk supplies.

A **SWOT** analysis with particular reference to Lodhran district is appended below:

Strengths

(a) Strong production base with respect to existing farming systems, animal breed (Nile & Ravi), land and water resources, and allied facilities; large number of milk animals, and on-farm and non-farm households involved in milk production already exist.

(b) Increasing demand and more precisely an existing supply demand gap which can absorb any significant increase in milk production or supply. Government has fixed milk production target of 43 billion litres by 2010.

(c) The supply demand also gives positive price signals for investing in the sector. Therefore, the profit margins are quite reasonable at all levels in the dairy value chain, even on packed liquid milk.

(d) Diversification towards high value agriculture with increasing income and awareness along with the demand supply gap there is a growing demand for enhancing share of livestock in the existing farming systems.

(e) Although there is demand supply gap, an abundant availability of raw material can be ensured with the development of a dairy value chain as presently more than 80% of milk produced is flowing through informal sectors which is disorganized and requires proper milk collection, processing and distribution system.

(f) With the government and private sector initiatives and policy focus a professionally trained, technical human resource pool is emerging with the passage of time.

Weaknesses

(a) Milk is highly perishable and therefore requires special attention for safe handling and quick delivery to the point of use or processing. The cool chain system in Lodhran district is almost non-existent. Whatever limited facilities exist they are confined to the processing plants.

(b) Milk yield is very low partly due to poor breeds and partly due to poor management practices including extensions services. The problem is further compounded by low yielding fodders and poor planning. AI is one of the most important practices for

improving breeds but the majority of dairy farmers still use natural methods with breeding bulls of without regard to their previous record.

(c) A large number of small farmers and scattered milk farmers make milk collection expensive and difficult. Due to the large geographical spread of the dairy farmers, the cost of collection increases along with the delay in reaching the final destination. Poor infrastructure in the rural areas with inadequate transportation facilities makes milk collection and procurement difficult.

(d) No chilling facilities with the major players in the wet market along with un-refrigerated transportation and farmers' poor knowledge about the safe storage and distribution of the milk to the industry's collection/chilling points of the further aggravate the situation.

(e) Lack of appropriate legislation encourages malpractices like adulteration.

(f) Lack of farmer groups, associations or cooperatives, tend to increase costs and weakens bargaining powers vis-à-vis market intermediaries including processing plants.

Opportunities

The dairy sector in Pakistan is heading towards take off stage and a lot of opportunities exist in this sector for entrepreneurs. There is a major shift in government policy and the private sector is also investing in this sector. Consequently the dairy farmers are responding by investing and specializing in animal husbandry by adopting best farm practices that will lead to further productivity improvement and provide new areas for investment. So, the industry still has long way to go before reaching saturation point. Some of the important areas that can be tapped are:

(a) The supply demand gap could absorb any significant increase in milk supply which provides a win-win situation for dairy farmers who respond to market signals and also for other stakeholders who can expand their business.

(b) The full potential of the dairy sector is still unexploited. There exists a large yield gap at all levels i.e. genetic yield gap, management yield gap and yield losses in the post-harvest management. The processing sector is also working at about 50% installed capacity. So the sector could still yield high returns on investment.

(c) Promotion of the dairy sector would also help in enterprise diversification for farmers; improve soil health by providing farmyard manure on the one hand and crop rotation with leguminous fodders and best utilization of crop residues etc., on the other.

(d) Under the current scenario of rising fodder prices, pasteurized milk is another area to be strengthened.

(e) On the processing side diversification in value addition for brand building would help to capture market share.

(f) There are many possibilities in product development along with the introduction of innovative methods in packaging and presentation.

(g) There is still a wide gap in the supply and demand of cultured products like yoghurt and cheese.

(h) Import substitution is needed for infant foods, geriatric foods and nutritional supplements.

(i) Post-harvest management technology is another green area that not only could open new areas for business people but would also help increase supply by reducing post-harvest losses in milk which are close to 15%.

Threats

(a) Despite being the fourth largest milk producer, Pakistan still faces milk and milk products shortages, and consequently, milk and dairy products imports are accelerating (currently approximately 2 kg per capita per year).

(b) Although there is comparative advantage and unexploited dairy potential, Pakistan may face severe competition, as many imports are subsidized by exporting countries.

(c) Quality control is almost paralyzed due to disorganized food control and inspection.

(d) There is a lack of affordable milk collection and processing equipment of appropriate capacity and technology. There is seasonal fluctuation in both milk production and fodder production, along with challenging climatic conditions.

(e) Small scale dairy farming, as 71% of the farmers own between one and four animals, as well as a lack of capital to develop these dairy farms and no cooperative or dairy farmers associations.

(f) The supply chain for milk involves numerous people, where the traditional milk collectors, known as *dodhis*, play the dominant middlemen role between millions of subsistence and commercial dairy farmers and consumers. There is also practically no cold chain development in the informal milk value chain and too much adulteration.

The 'strengths' and 'opportunities' far outweigh 'weaknesses' and 'threats' as mentioned. With the diversification towards high value agricultural products, mainly livestock products, a bright future in the shape of market expansion for dairy products is forecasted.

DEVELOPMENT STRATEGIES AND ACTION PLAN

Value Chain Development Rationale

Production, processing and distribution of agricultural commodities including livestock are being increasingly organized into value chains where the flows of inputs, products, information and financial resources are integrated to improve the performance of all players including farmers, processors, retailers and others. The growing competition in trade in agricultural commodities has necessitated adoption of value chain concept through enhancing linkages between various players in order to reduce costs and add value.

Livestock contributes 52.10% of the value of all agricultural products within the agriculture sector (Pakistan Economic Survey 2007-08). This has direct bearing on the lives of millions of people in rural areas who represent small holders. The study shows that the dairy sector in Pakistan faces major problems, and is far from performing at its potential market value. Low milk yields and low prices leave little margin for savings leading to investments in livestock. Improvements in yields and prices can lead to significant monetary benefits for the poor rural population.

Very little has been done to exploit the potential of dairy sector through developing its base from micro level. Therefore, value chain development would be helpful in increasing indigenous milk production and assisting in its efficient distribution. It would also help raise the economy of dairy farming, generate income in the dairy farming households and ultimately contribute to alleviate poverty.

A snapshot of problems[2] and possible remedies / interventions

The following section provides an overview of problems / constraints / issues faced in dairy sector and what possible interventions may be required to overcome those:

Constraints	Possible Interventions
Genetically low yielding animals	• Install breeding programme for Sahiwal/Cholistani cow & Nile/Ravi buffalo • Set up semen stations (Halla model) • Expand AI services
Animals under stress due to poor management (space, water, fodder & feed)	• Create awareness on improved hygiene & management practices • Adequate space & access to drinking water • Incorporate fodder in cropping pattern to avoid scarcity of summer & winter fodder • Feed concentrates • Use of silage

[2] This report gives a lot of details on problems and issues which dairy sector faces today in Pakistan.

Constraints	Possible Interventions
Diseases, worms infestations & milk let down	• Create awareness • Undertake preventive (vaccination) and curative measures against diseases (HS, FMD, Mastitis & red water) • Regular de-worming of animals • Counseling/advocacy, fast & timely milking, sanitation, etc.
Lack of technology	• Introduce fodder reapers • Introduce ration mixing machines • Promote milking machines
Small uneconomical marketable surpluses	• Organize farmer groups (DFFS) • Promote market linkages (processors)
Poor milk collection	• Expand network of FMCCs (processors) • Provide cooling tanks/ chillers (cost sharing)
Limited value addition	• Improve quality of existing value added products (best practices) • Introduce high value added products like mozzarella cheese
Malpractices (incorrect measurements, adulteration, illegal production of vaccine, etc.)	• Legislate & enforce regulatory measures • Advocacy & counseling • Provide laboratory support where needed • Joint monitoring by stakeholders (public & private sector)
Poor extension services & access to inputs	• Improve extension services (public & private) • Service providers from within the beneficiaries • Group activities to attract entrepreneurs • Legislate & enforce where necessary
Lack of capital (credit)	• Financial support on the pattern of PDDC & LDDB • Simplified procedures for institutional credit (one window operation) • Special products for landless dairy farmers
Capacity building of stakeholders	• Organize farmers' trainings in best practices • Impart training in fodder production, crop residue enrichment & supplementary feeding • Organize farmers training in handling &Marketing • Organize orientation/ refresher trainings for extension staff (public & private) • Conduct trainings of milk collectors & suppliers/contractors in hygiene and improved handling practices • Organize trainings for women
Poor status of women & children (nutrition)	• Skill development training • Income generating activities • Biogas plants • Value added products (cheese, etc.)

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