REPORT

DAIRY CHAIN OPPORTUNITIES
INDIA, PAKISTAN AND BANGLADESH

THE TRADE COUNCIL
SOUTH ASIA

Date 08.2017
Our ref. Ashish Paliwal, Aslam Perwaiz, Saadia Taufiq
INDIA

TABLE OF CONTENTS
1. Introduction – India and Indian agriculture.................................................................2
2. Milk production.............................................................................................................3
3. Dairy value chain..........................................................................................................6
4. Different value chain segments and opportunities......................................................7
5. Milk demand and processing......................................................................................12
6. Dairy trade ....................................................................................................................14
7. Policy environment and government support ............................................................14
8. Growth drivers ............................................................................................................17
9. Challenges/Opportunities..........................................................................................17
10. Conclusion and future prospects .............................................................................18
**INTRODUCTION – INDIA AND INDIAN AGRICULTURE**

India is the seventh-largest country by area, the second-most populous country (with over 1.2 billion people), and the most populous democracy in the world. During 2015 India was the seventh largest economy by nominal GDP and third largest by purchasing power parity. The Indian economy is one of the fastest growing globally with an impressive growth rate of 7.1% in 2016.

India is a federal republic governed under a parliamentary system and consists of 29 states and 7 union territories.

Agriculture in India dates back to Indus valley civilization era. Today India stands second in the world in terms of farm output. India owns the world’s second largest arable lands after USA. The contribution of Indian agriculture (together with forestry and fisheries) in total national GDP is 17.1%. With advent of an evolving service industry, contribution of agriculture to India’s GDP has declined, yet it plays a significant role in the overall socio-economic fabric of India, as more than 58% of its population is dependent upon agriculture for their livelihoods.

**INDIAN DAIRY**

The dairy sector continues to be one of the major livelihood sources for rural India. Dairy farming has traditionally been integral to Indian rural economy and recognized as an instrument for socio-economic development. India owns the world’s largest bovine population and stands as the world’s largest producer and consumer of dairy products. The estimated dairy industry size is around USD 77 billion. Unlike other major milk producing countries, the nation's milk supply comes from millions of small producers, dispersed throughout the rural areas. Farmers maintain an average herd of one or two milch animals, comprising cows and/or buffaloes. The animals' nutritional requirements are largely met by agricultural waste and by-products. Ample labour and a small land base encourage farmers to practice dairying as an occupation subsidiary to agriculture. While income from crop production is seasonal, dairying provides a stable, year-round cash flow, which is an important economic incentive for the small farmer to take to dairying.

India has a large vegetarian population that consumes milk and milk products for their daily protein requirement. Availability of milk and milk products ensures the nutritional security of the population. The per capita milk consumption is registering a steady increase over the years and has reached now to 337 gms/day (2015-16).

**1. MILK PRODUCTION**

India has witnessed remarkable growth in its production and consumption of milk and dairy products in recent years and this trend is almost certain to continue. India is the largest producer of milk in the world with a production of 155.5 million tonnes during 2015-16. Milk production has increased by a CAGR (Compound Annual Growth Rate) of 4% during the last 5 years of span. With a large vegetarian population that consumes milk and milk products for their daily
protein requirement, the per capita consumption of milk in India has increased from 176 grams per day in 1990-91 to 337 grams per day in 2015-16. It was more than the world average of 305 grams per day during 2015.

India’s milk production continues to grow to the point where it now tops the milk output of all the European Union countries combined. India has actually been the world’s top milk-producing country since 1997, but in the year 2014, for the first time, it beat the entire EU.

Figure 1: Indian milk production over the years and availability of per capita milk production

Source: Department of Animal Husbandry, Dairying & Fisheries (DADF), Ministry of Agriculture & Farmers’ Welfare, and National Dairy Development Board

**REGIONAL MILK PRODUCTION**

Unlike poultry and fishery, dairy is practiced in all across India in almost all the states. However, all the states do not stand uniform in dairy farming and thereby in milk production. Almost 80% of milk in India was produced by the top 10 milk-producing countries in 2015-16.

**DAIRY FARMING**

There are approximately 75 million rural households in India engaged in dairy farming. The ownership of cattle and buffalo in India is fragmented with an average herd size of two animals. Approximately 73% of cattle and 66% of buffaloes are on land holdings of less than 2 hectares (around 83% of India’s agricultural holdings). While larger farmers have more animals per farm.
### Dairy Farms Based on Size of Land Holding

<table>
<thead>
<tr>
<th>Land Holding Category</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Landless (Less than or equal to 0.002 ha)</td>
<td>Whenever possible, farm implements and tools are hired when required. 0 - 1 cattle. Cattle fed with household food waste and grazing. Farmers: Mostly illiterate</td>
</tr>
<tr>
<td>Marginal (0.002 - 1 hectares)</td>
<td>Whenever possible, farm implements and tools are hired when required. 0 - 1 cattle. Cattle fed with household food waste and grazing. Farmers: Mostly illiterate</td>
</tr>
<tr>
<td>Small (1.01 to 2 hectares)</td>
<td>Farm implements and tools are hired when required. 2 to 3 cattle. Cattle fed with household food waste, grazing and some feed and fodder bought from the market. Some government assistance in the form of grants and subsidies. Farmers: Mostly illiterate</td>
</tr>
<tr>
<td>Semi-medium (2.01 to 4 hectares)</td>
<td>Farmers would own a few farm implements and tools. Would own between 5 – 15 cattle. Cattle fed with household food waste, grazing and feed and fodder bought from the market. Some government assistance in the form of grants and subsidies. Farmers: Primary education</td>
</tr>
<tr>
<td>Medium (4.01 to 10 hectares)</td>
<td>Farmers would own farm implements and machinery like tractors, generators, cultivators, sheds for storage of fodder etc. On an average they would own 50 – 300 Cattle including 6 buffaloes and 2 cross bred cattle. Some numbers of sheep, goat and pigs. Cattle fed with household food waste, grazing and some feed and fodder bought from the market. Land is also allocated to grow fodder for the cattle and to build sheds for them. Some also lease land to grow fodder. Farms funded by local cooperative banks or public sector banks. Farmers: Secondary / Higher Secondary education</td>
</tr>
<tr>
<td>Large (&gt; 10 hectares)</td>
<td>Farming on a large scale. This is mainly corporate backed farming with cattle more than 1000 in numbers. Large Scale farms have proved difficult to establish and there are very few such farms in India. Land and labour costs, feed costs, management costs, restrictions on import of cattle are some of the reasons for this. Some fodder is grown on the land or land is leased out to grow fodder. Barns for the animals are built on the farms. Feed is bought from the feed companies to ensure yield quantities and quality. Farmers: Graduate / Diploma Degree Holders</td>
</tr>
</tbody>
</table>
On account of variety of factors such as the size of land holding, traditional background, market availability, consumer preference and government policy; dairy farming in India is undergoing a transitional phase. This transition can be observed looking at the evolving farm sizes, farm management practices and level of application of advanced technology.

To explain better, Indian consumers due to variety of the factors have started looking for the milk with improved nutritive value, better quality and traceability. This change is being welcomed with a growth in organized segment where end-to-end integration have started taking place. As a result, medium scale dairy farms with a count of 50 to 300 animals are coming up. During the past 5 years, the industry has experienced a shift from small scale to medium scale dairy farming. Such farmers usually have a land holding of 1.5 acres or more. Animal houses/sheds are build up to a capacity of 300 animals. Farmers use the remaining land for growing fodder and arable crops. They also undertake practices such as the silage making. These farmers charge premium while selling their milk directly to consumers or processors. Milk processors such as Nestle, Hutson dairy, VRS foods are ready to pay premium if they are sure to procure a better quality of milk.

### 2. Dairy Value Chain

The majority of milk is being produced by smallholder farmers who produce at farm and then pour the milk at nearby village level collection centres (VLC). The animal breeding, farm management, veterinary support and other farm level management practices are taken care of by farmers themselves generally. In case of some co-operatives and private players who are connected with farmers directly, provide support in terms of farm inputs and knowledge. The farm inputs could be
superior quality semen, animal feed and feed additives, medicines, milking machines, knowledge etc.

In absence of VLCs in the vicinity, the milk is procured by the middlemen/commission agents and they sell it to milk processors. Further along the chain milk is taken to a big chilling centre and from here it reaches to the processing plant. The processed milk and milk products are transported in the chain to the end consumer. All through this cycle cold chain has the most important role to play as milk is a highly perishable commodity. Lack of cold chain infrastructure is probably the biggest challenge in the country’s dairy industry as it limits the integration of millions of farmers outside of the organized sector’s reach. Meanwhile the growing forward integration is forcing milk processors to invest in the backward chain to strengthen and ensure procurement of milk.

Figure 3: India – Dairy value chain elaborated

This is how a typical dairy value chain looks – it is applicable for the most parts of India.

3. Different Value Chain Segments and Opportunities

Animal Genetics

India is the largest milk producing country in the world. Unlike other major milk producing countries almost half of the total Indian milk production comes from buffaloes and the other half is from cattle. Furthermore, the dairy industry also accounts for milk production from goats.
As the figure above explains indigenous buffaloes contribute highest in milk production with a share of 36% followed by crossbred cattle at 26%. Indian livestock census report classifies the bovine population in three major categories:

- Exotic/crossbred cattle,
- Indigenous cattle, and
- Buffalo

During the late 1960s crossbreeding as a technique to improve the existing cattle genetics, started taking place where the indigenous cattle was inseminated with high yielding foreign breeds. The most popular breeds for crossbreeding were Holstein-Friesian, Jersey, and Brown Swiss. The practice continued to get popularity and as a result, the population of crossbreed cattle herd has grown to 39.7 million or 21% of cattle population. The figure below explains the trend in population of indigenous and crossbred cattle.

Table 1: Projected changes in Livestock population – 2020 (in million)

<table>
<thead>
<tr>
<th>Species</th>
<th>Population as per LS 2012 census</th>
<th>Projected population 2020*</th>
<th>Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>Crossbred (CB) cattle</td>
<td>39.73</td>
<td>65.3</td>
<td>64.4%</td>
</tr>
<tr>
<td>Indigenous cattle</td>
<td>151.17</td>
<td>161.37</td>
<td>6.7%</td>
</tr>
<tr>
<td>Buffalo</td>
<td>108.7</td>
<td>115.6</td>
<td>6.3%</td>
</tr>
</tbody>
</table>

**Indian bovine breeds**: India has the world’s largest cattle and buffalo population. The country has been blessed with a very diverse geography and climatic conditions, which supports a similarly diverse array of cattle and buffaloes. The native breeds have low yield potential but at the same time are capable of improved yields and also carry beneficial traits in terms of disease resistance, adaptability and relatively low nutritional requirements.
India possesses 27 acknowledged indigenous breeds of cattle and seven breeds of buffaloes. These well-defined breeds are found in the dry parts of the country. Other types of breed are non-descript and do not belong to any defined breed. Some of these — Sahiwal, Gir, Red Sindhi, Tharparkar and Rathi — are known for their milking prowess. A few others, such as Kankrej, Ongole and Hariana, belong to dual breeds that have both milch and draught qualities i.e. they are good plough animals. The rest are pure draught breeds.

Some of the most popular milk yielder breeds are:
- **Indigenous cattle**: Gir, Red Sindhi, Sahiwal, Thaparkar etc.
- **Buffaloes**: Murrah, Bhadwari, Pandharpuri, Jaffarabadi, Mehsana etc.

**ANIMAL FEED AND FEED PREMIX**

Dairy Feeding Systems in India are prevalent of small dairy farms primarily based on grazing of native pastures of low nutritive value. Cattle and buffaloes are usually fed on wheat, paddy, millet, sugarcane tops and other straws and leftovers. These are supplemented with small quantity of grass available for grazing. The amount of concentrate fed to growing, working, pregnant and dry animals is very little. It is mainly the lactating animals that are fed by-product concentrates such as oil cakes, brans and milled pulses.

According to the National Dairy Development Board, the feeding systems of cattle can be categorised into the following six groups in table 2 on the next page.

India has the largest bovine population, which is the main reason for its robust performance on account of milk production. However, the ever growing population is not expected to keep up the growth of milk production when the resources are limited to support this population. The table below depicts the projected demand and availability of feed/fodder by 2020 in India.
Table 2: Six groups of feed categories

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dry Fodder Feed</td>
<td>Dry Fodder Feed</td>
<td>Dry Fodder Feed</td>
<td>Green Fodder Feed</td>
<td>Silage</td>
<td>Silage</td>
<td></td>
</tr>
<tr>
<td>Compound Feed</td>
<td>Green Fodder Feed</td>
<td>Homemade Concentrate Mix</td>
<td>Compound Feed</td>
<td>Dry Fodder Feed</td>
<td>Compound Feed</td>
<td></td>
</tr>
<tr>
<td>Concentrate Feed</td>
<td>Compound Feed</td>
<td>Grazing</td>
<td>Concentrate Feed</td>
<td>Concentrate Feed</td>
<td>Concentrate Feed</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Demand Projections (2020) (million MT)</th>
<th>Availability Projections</th>
<th>Shortfall (2020) (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dry Fodder Feed</td>
<td>468</td>
<td>417</td>
<td>11</td>
</tr>
<tr>
<td>Green Fodder Feed</td>
<td>213</td>
<td>138</td>
<td>35</td>
</tr>
<tr>
<td>Concentrate Feed</td>
<td>81</td>
<td>44</td>
<td>45</td>
</tr>
</tbody>
</table>

Source: CLFMA Annual Survey 2013-14, NDRI

Most farmers buy all types of feeds, i.e. homemade concentrates mix, compound feed, green and dry fodder. About 40% go for branded feeds. The pattern of buying is not regular, some farmers buy as and when required and some buy on a weekly basis.

**Compound feed:** Compound feed plays an important role in improvement in milk yields of cattle and buffaloes by offering a balanced ration. Driven by the strong growth in dairy industry, compound feed volumes have increased at an average rate of 6 percent between 2007- 08 to 2012 - 13. The current production amounts are sufficient to feed only about 7% of the total breedable animals in India. The compound feed for dairy industry in highly underpenetrated.

Assuming that if half kilogram of concentrate is required to produce one litre of milk; the total concentrate demand for the dairy industry is 78 million tonnes in India. However, the feed sector for the dairy is highly underpenetrated at 11 percent. With the farm gate prices of milk and entry of commercial dairy farms the potential for the cattle feed is bound to increase.

Key drivers for Compound Feed for dairy industry:
- The acceptability of farmers to spend more on health of their animals.
- Changing focus of farmers i.e. from treatment to preventing diseases.
- Consumer demand for quality milk is forcing industry to comply with standards, thereby demanding quality compound feed.
- Over the years, focus of dairy industry has shifted towards increasing milk productivity per animal thus leading to increasing the compound feed demand.
- Introduction of high yield cattle requires better nutrition and better care.
- Emerging trend of integrated cattle farms is augmenting the demand for cattle feed.
New initiatives in Indian Feed Sector:

Silage: Making of silage is gradually becoming popular due to the growing shortage of green and dry fodder. The rising feed costs are also motivating farmers to go for silage. The practice is popular in the North Indian states of Punjab and Haryana. The silage has a good effect on high producing animals due to its nutritional value, digestibility and appetizer effect. The silage is also very helpful during the times of the year when there is acute shortage of feed and fodder.

Green fodder hydroponics: In order to ensure the timely and regular supply of green fodder, farmers are opting for hydroponics due to its cost effectiveness and reliability. India has witnessed several consecutive droughts during past years, which have forced farmers to opt for alternate means of fodder production.

Protein Feed: Bypass Protein Feed is a new generation cattle feed in India and is manufactured by a special formulation developed by NDDB. Bypass Protein Feed (BPF) contains a large percentage of solvent extracted protein meals, grain by-products, whole grains, molasses, minerals and vitamins.

Animal Health

A large number of infectious and metabolic diseases prevalent in Indian livestock have serious implication for animal productivity, export potential and safety/quality of livestock products, and many of these diseases have zoonotic implications. The current efforts of prevention and control of livestock diseases need to be strengthened. There is a shortage of veterinary and para-veterinary manpower and facilities including mechanisms for diagnosis, treatment, tracking and prevention of the diseases. Adequate infrastructure for ensuring bio-security, proper quarantine systems and services to prevent the ingress of diseases across the states and national borders is not available.

Dairy Farm Mechanization

Dairy farming in India is leading through a phase of consolidation due to various reasons such as the changing perception from traditional farming to commercial activity, regular cash flow, growing customer demand, instant market etc. Other factors leading consolidation are shortage of labour (and skilled labour), unviability of small sized farms and farmers’ willingness to invest.

In the wake of the above dairy farming in India is witnessing the gradual introduction of farm mechanization so as to reduce dependence on expensive and even uncertain labour availability. Farmers are investing more and more in field machines, which are useful for:

- Fodder farming and harvesting
- Silage making machines
- TMR (Total Mixed Ration) machines
- Farm management machinery such as manure cleaners, farm cooling
- Milking machines and milk parlours
- Bulk milk coolers etc.

Depending upon the scale and economy of a farming enterprise, the farmer decides to buy a machine. Sometimes a group of farmers also purchase the machine and uses it as in a model of community farming.
4. MILK DEMAND AND PROCESSING

Government of India estimates that nearly half of the country’s milk production (almost 48%) is consumed by the households and it is not marketed. This milk is consumed either in unprocessed liquid form or converted into traditional products such as curd, butter, ghee (clarified butter), paneer (cottage cheese) etc. The big chunk of remaining milk (almost 36% of total production) is marketed by small-scale vendors, also known as doodhwala (milkmen). Now the 15% of milk production goes through the organized processing sector. The private and co-operative sector process almost equal share into packaged milk and value-added dairy products.

Dairy Co-operatives: These are farmer-owned milk processors organized using the ‘Anand Model’ that originated in the state of Gujarat prior to independence. It has been one of the most successful co-operative movement of India and an early key driver of dairy development in India. All the states have their own co-operatives.

Private Dairy processing: Prior to 1991, the investment in dairy marketing and processing was restricted to co-operative sector only, barring few exceptions. Post 1991, it was delicensed i.e. opened for private investments. Private sector capacity is now expanding faster than the co-operatives.

Milk and milk products form an essential part of Indian diet which is primarily vegetarian. It is one of the important sources of protein for the vegetarians. Majority of the market is still dominated by liquid milk but the demand for value-added dairy products is increasing especially in urban areas. Indian dairy and milk products market is estimated at USD 77 billion during 2015-16. The industry is expected to grow at 12-13% CAGR until 2018-19 driven by rising milk prices; rising share of value-added and packaged dairy products.

Figure 7: Market size of milk and milk products

Source: Internal
Industry players are diversifying into value-added dairy products like ice cream, cheese, curd and flavoured milk owing to higher margins as compared to liquid milk. Segments like ghee, paneer and butter milk have lower presence of branded players as compared to cheese, ice cream and butter.

Within the dairy processing, some of the largest players with respect to milk procurement are mentioned in the table below.

**Table 4: Companies dealing with milk procurement**

<table>
<thead>
<tr>
<th>Daily milk procurement</th>
<th>Name of the entity</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.6 MLPD</td>
<td>Hutson Agro Products</td>
</tr>
<tr>
<td>1.0 to 1.5 MLPD</td>
<td>Parag Milk Foods</td>
</tr>
<tr>
<td></td>
<td>Schreiber Dynamix Dairies</td>
</tr>
<tr>
<td></td>
<td>Heritage Foods Limited</td>
</tr>
<tr>
<td></td>
<td>Tirumala Milk Products</td>
</tr>
<tr>
<td></td>
<td>Kwality Dairy</td>
</tr>
<tr>
<td></td>
<td>Sterling Agro Industries</td>
</tr>
<tr>
<td></td>
<td>VRS Foods</td>
</tr>
<tr>
<td></td>
<td>Bhole Baba Milk Food Industries</td>
</tr>
<tr>
<td></td>
<td>Nestlé India</td>
</tr>
<tr>
<td>0.5 to 1.0 MLPD</td>
<td>Creamline Dairy Products</td>
</tr>
<tr>
<td></td>
<td>Dodla Dairy</td>
</tr>
<tr>
<td></td>
<td>SMC Foods</td>
</tr>
<tr>
<td></td>
<td>Gopaljee Dairy Foods</td>
</tr>
<tr>
<td></td>
<td>Indapur Dairy And Milk Products</td>
</tr>
<tr>
<td></td>
<td>Prabhat Dairy</td>
</tr>
<tr>
<td></td>
<td>Milk Food Limited</td>
</tr>
<tr>
<td></td>
<td>Anik Industries</td>
</tr>
<tr>
<td>17 MLPD</td>
<td>Gujarat Cooperative Milk Marketing Fed. – Amul</td>
</tr>
<tr>
<td>6.3 MLPD</td>
<td>Karnataka Milk Fed. – Nandini</td>
</tr>
<tr>
<td>3 MLPD</td>
<td>Tamilnadu Cooperative Milk Producers Fed. – Aavin</td>
</tr>
<tr>
<td>2.5 MLPD</td>
<td>Rajasthan Cooperative Dairy Fed. – SARAS</td>
</tr>
<tr>
<td>1.7 MLPD</td>
<td>Bihar State Milk Cooperative Fed. – Sudha Dairy</td>
</tr>
</tbody>
</table>

**MLPD**

*Million Litres Per day*
5. Dairy Trade

The growth rates of India's dairy export and import have both increased, but the export has grown faster than that of import in both value and volume terms. However, India's export performance is not up to its true potential. The key reasons attributed to its below-par export performance are:

- High population pressure and thereby the high local consumption
- Low level of milk processing
- High cost of logistics
- Occasional ban on export of dairy products
- Poor quality and hygiene standards of dairy products being exported
- Insufficient international marketing efforts
- Highly protected world dairy markets.

Furthermore, import of dairy products has been insignificant. India, which was a net importer of dairy products until 2001, became a net exporter of dairy products, indicating a good export potential for Indian dairy industry. Recent experiences show that dairy exports on a large scale benefit milk producers, but do not hurt consumers. For example, in 2013, dairy farmers got the best-ever price for milk. This was because of higher global demand, resulting in large dairy exports from India.

The Indian dairy export basket has experienced diversification. The exports of skim milk powder (SMP), butter, whole milk powder (WMP), casein and ghee have gone up considerably in value terms during the last decade.

Imports: The composition of imported products keeps changing each year depending on the domestic and international demand-supply situation and prices. However, the chief dairy products imported by India include butter oil, whey products, cheese and milk powders. The major nations from where India brings dairy products are Denmark, Nepal, USA, France, the Netherlands and Italy.

Exports: India is the largest net exporter of dairy products in Asia. The chief importers of Indian dairy products are mainly developing countries, namely, Bangladesh, the United Arab Emirates, Pakistan, Nepal and Bhutan. As far as loyalty of importers of Indian dairy products is concerned, Bangladesh and the UAE are likely to gain market shares from the other importers of Indian dairy products.

6. Policy Environment and Government Support

Organization of Government and Regulatory Framework

As mentioned earlier India is a federal republic governed under a parliamentary system and consists of 29 states and 7 union territories. The Department of Animal Husbandry, Dairying & Fisheries (DADF) is one of the Departments under the Ministry of Agriculture and Farmers Welfare. It came into existence on February 1, 1991 by merger of two Divisions of the Department of Agriculture and Cooperation viz. Animal Husbandry and Dairy Development into a separate
Department. The Fisheries Division of the Department of Agriculture & Cooperation and a part of the Ministry of Food Processing Industries were later transferred to this Department on October 10, 1997.

The Department is responsible for matters relating to livestock production, preservation, protection & improvement of stocks, dairy development, matters relating to the Delhi Milk Scheme and the National Dairy Development Board. It also looks after all matters pertaining fisheries, which includes inland and marine sectors and matters related to the National Fisheries Development Board.

Ministry of Agriculture, Govt of India is responsible for regulating and devising broad based policies. However, as per the constitution the India, agriculture (and animal husbandry) is a subject related to state government.

Role of central level Ministry of Agriculture and state level Animal Husbandry departments: The protection of animal health, animal nutrition, breeding etc. is the responsibility of State Governments. However, the Central Government plays a key role in formulating broad based policies for matters related to livestock production, preservation, protection and improvement of stocks, dairy development, increasing animal productivity, including control of diseases, which are all of national importance. However, it is on a state’s disposal to follow them or to formulate different policies.

The Central Government advises the State Governments/Union Territories in the formulation of policies and programmes in the field of animal husbandry, dairy development and fishery. The main focus of the activities is:

- Development of requisite infrastructure in States/UTs (Union Territories) for improving animal productivity.
- Preservation and protection of livestock through provision of health care.
- Strengthening of central livestock farms (Cattle, Sheep and Poultry) for development of superior germplasm for distribution to states.
- Expansion of aquaculture in fresh, brackish water, welfare of fishermen etc.

Agriculture (arable and animal husbandry) is a State subject as mentioned earlier and the State Governments are primarily responsible for the growth of the sector. State Governments formulates state-specific policies on basis of several factors such as climate, arable agricultural production, local animal resources and climate. This can be understood from the fact that fishery is a state subject under the constitution of India but very few states have dedicated bodies for the development and marketing of fish produced in the state.

**SPECIAL PROGRAMS FOR DAIRY DEVELOPMENT**

**National Livestock Mission (NLM):** Objectives of sustainable growth and development of livestock sector, including poultry. The focus is on availability of feed and fodder by intervention of technology such as using high quality seeds, extension activities (skill development) and post-harvest solutions. Genetic upgradation of cattle along with disease management by way of community participation are key additional program areas.
**Rashtriya Gokul Mission:** A project under the National Program for Bovine Breeding and Dairy Development has been launched with the objective of conserving and developing indigenous breeds in a focused and scientific manner. The productivity of the indigenous breeds will be enhanced to its potential through professional farm management and superior nutrition, as well as gradation of indigenous bovine germplasm.

**Cattle and Buffalo breeding policy in different states under national Project for Cattle and Buffalo Breeding (NPCBB):** The objective is to preserve and conserve indigenous breeds in their breeding track through selected breeding.

**Dairy Entrepreneurship Development Schemes:** The scheme is being run in collaboration with NABARD (National Bank for Agriculture and Rural Development) but presently is covering small farms and farmers up to 10 animals. The main objective of the scheme is to extend assistance for setting up small dairy farms and other components to bring structural changes in the dairy sector.

**Foot & Mouth Disease Control Programme (FMD-CP):** The objective of this program is to prevent economic losses due to foot and mouth disease. This is one of the most economically devastating contagious viral animal diseases affecting all susceptible cloven-footed animals. As per the estimates by the Indian Council of Agricultural Research (ICAR), direct loss due to milk and meat is to the tune of almost USD 4 billion per annum. It can be much more if indirect losses due to reduced work capacity, abortions, subsequent infertility and sterility (that accounts for the reduced milk production subsequently) are taken into account. The program was initiated during 2003-04 in a limited geographic area, which has been increased to a wider geographic area now.

**Policy on cow slaughter:** In the most states of India slaughtering of cow and bull is prohibited, however in a few states slaughtering is allowed on fit-to-slaughter basis. The policy needs a review as no productive animals or sick animals are a major concern for the profitability of a commercial dairy farm. These unproductive animals are a big burden on available feed and fodder resources, which are otherwise running under heavy storage.

**Central Herd Registration Scheme Objectives:** This scheme is also linked to National Livestock Mission. The scheme aims to identify and locating the superior germ plasm of cattle and buffalo. The scheme manage to generate and use the breeding value data for producing superior germ-plasm, and at the same time preserving indigenous germ plasm.

**National Dairy Plan I:** National Dairy Plan Phase I (NDP I) is a Central Sector Scheme for a period of 2011-12 to 2018-19. It is a scientifically planned multi-state initiative with the objective of increasing milk production and to provide a greater access to rural milk producers through organised milk-processing sector. NDP I will focus on 18 major milk producing states.
7. GROWTH DRIVERS

**Favourable demographic trends:** Increasing population, rapid urbanisation, number of working women, and disposable incomes have increased consumers’ access and willingness to packaged dairy products.

**Strong growth in India’s organised dairy industry:** Due to the formalisation of perishable milk products and the growth of value-added dairy products, the focus has been brought onto raw milk sourcing. In the coming years, milk procurement could become the single most critical link in the dairy supply chain. Medium scale dairy farms (with 50 to 300 cattle) could emerge as one of the key growth drivers in the Indian dairy sector.

**Growth in consumption of value added dairy products:** Driven by the rise in urbanization, affordability and demand for healthy food, the share of value-added dairy products has been estimated at USD 12.2 billion during 2014/15 and is expected to be USD 24.3 billion during 2019/20 by Rabo bank.

**Government incentives and focus:** Granting priority for lending status to the dairy industry and improving supply through the National Dairy Plan are incentives provided by the government to attract investments from more companies, thus enabling the sector to grow at a strong pace. Government is also providing financial assistance for strengthening value chain integration.

**Growing demand packaged products:** Due to growing awareness amongst consumers has led to increase in demand of better quality, longer shelf life packed products across price levels.

**Improvement in supply chain infrastructure:** With better cold storage facilities, transportation, and other critical supply chain infrastructure across India, companies will be able to increase the penetration of processed milk products in towns and villages, thus driving growth of the industry.

8. CHALLENGES/OPPORTUNITIES

Despite the exponential growth of the dairy industry, India is still facing challenges of poor milk quality, low yield, lack of infrastructure and a fragmented production. A number of infrastructure related bottlenecks are still present in both back-end and front-end supply chain. Some challenges are mentioned here:

- **Breeding infrastructure and genetics:** The success of Indian dairy was mostly due to rising number of animals not productivity. When the resources are limited, it is imperative to increase the productivity per animal. There is a high demand of good animal genetics, breeding infrastructure and advance breeding methods such as artificial insemination, embryo transfer etc.

- **Animal feed and fodder:** There is an acute and ever growing shortage of green fodder and good quality feed. Growing trend of high breed animals is creating a huge demand for good quality feed and fodder to cater the dietary requirement of milking animals. Also in order to avoid many health and nutrition related complications prophylactic approach is driving the use of feed pre-mixes.
• Animal health: Good healthcare and animal disease diagnostic solutions are required to address the gap. As above high yielding animals demand extra care and over the years this trend is driving the animal health segment.

• Farm mechanization: Despite being the country of 1.2 Billion population there is growing shortage and cost of labour. Farm mechanization is being welcomed by farmers to address the situation.

• Cold chain infrastructure: There is a lack of required infrastructure of chilling plants and bulk coolers to prevent contamination and spoilage at village level. This segment is bound to see growth opportunities as the government and private sector is investing heavily in it in order to secure sufficient procurements.

• Power availability: Many chilling plants suffer due to shortage of electricity and do not run optimally leading to poor quality and shelf life of milk. The opportunity within this segment could be solar powered milk chillers.

• Quality testing infrastructure and trained work force: Adequate quality testing infrastructure is not available at milk collection centres. The problem is compounded by the lack of trained manpower to undertake quality testing. At the consumer end, the demand for safe food is emerging fast and thus creating high opportunity.

• Processing equipment and food ingredients: Growing consumer awareness and shifting lifestyle are forcing processors to move towards the product innovation and thus a growing demand of high quality equipment and various food ingredients.

9. CONCLUSION AND FUTURE PROSPECTS

On account of a growing middle class, rising prosperity, changing food habits and level of awareness, the demand of milk and milk products is certainly going to increase on a rapid pace in the Indian market. The future of Indian dairy depends highly upon its ability of improving the backward chain integration and on the growth and competitiveness of emerging dairy sectors.

An increasing magnitude of milk processing capacity is going to put a lot at stake on procurement of quality milk. In such scenario, there will be a lot of processors investing in developing the backward chain as well as to create cold chain infrastructure. The approach is likely to bring more farmers in the reach of the organized sector. These developments will drive the entire chain rapidly and are already resulting in a lot of progress. In fact, India’s expanding cooperative and private sector milk-processing enterprises are gradually becoming active in facilitating changes in the current small-scale structure of dairy production, improved animal feeding practices, and gains in productivity and marketing.

A lot of innovation is taking place at consumer-end and thus the requirement of new technology, machinery, packaging solutions, food diagnostics and food ingredients is increasing.
REFERENCES:

FAO
Press Information Beaura
IFCN Dairy Analysis
NABARD
ASSOCHAM estimates
Internal Estimates
YES Bank and Rabo Bank estimates
Internal and industry
APEDA
Department of Animal Husbandry, Dairying and Fisheries (DADF)
National Sample Survey Organization (NSSO)
NDDB Annual Report

http://www.gktoday.in/rainfed-agriculture-in-india/
http://vikaspedia.in/agriculture/livestock/cattle-buffalo/breeds-of-cattle-buffalo
http://pib.nic.in/newsite/PrintRelease.aspx?relid=148556
http://www.nabard.org/content.aspx?id=591
# Table of Contents

1. Introduction – Pakistan and Pakistani agriculture........................................... 21
2. Milk production........................................................................................................ 24
3. Dairy value chain...................................................................................................... 26
4. Different value chain segments and opportunities.............................................. 27
5. Milk demand & processing..................................................................................... 29
6. Dairy trade................................................................................................................ 30
7. Policy environment and government support..................................................... 31
8. Growth drivers.......................................................................................................... 32
9. Challenges/Opportunities....................................................................................... 33
10. Conclusion and future prospects........................................................................... 33
Livestock farming is an integral part of the rural economy of Pakistan as this is the only sector which provides almost regular income and readily cashable asset to farming families. Agriculture plays a central role in national development, food security and poverty reduction. The rapid growth of Pakistan’s urban areas indicates that demand for high-value perishable products such as fruits, vegetables, dairy, and meat is rising. Government is focusing to increase the yield for rural growers through major infrastructure investments including reliable transport networks and other building blocks for modern supply chains. China–Pakistan

| Location | Southern Asia, bordering the Arabian Sea, between India on the east and Iran and Afghanistan on the west and China in the north |
| Border Countries (4) | Afghanistan 2,670 km, China 438 km, India 3,190 km, Iran 959 km |
| Area | 796,095 km² |
| Capital City | Islamabad |
| Sub Region | Southern Asia |
| Population | 199.71 million (Estimated) |
| 2017 Population Growth Rate | 1.86% |
| Population Rank | 6th largest population in the world |
| GDP Growth | 5.28% |

1. **Introduction – Pakistan and Pakistani Agriculture**

Livestock farming is an integral part of the rural economy of Pakistan as this is the only sector which provides almost regular income and readily cashable asset to farming families. Agriculture plays a central role in national development, food security and poverty reduction. The rapid growth of Pakistan’s urban areas indicates that demand for high-value perishable products such as fruits, vegetables, dairy, and meat is rising. Government is focusing to increase the yield for rural growers through major infrastructure investments including reliable transport networks and other building blocks for modern supply chains. China–Pakistan
Economic Corridor (CPEC) will go a long way in the enhancement of agribusiness benefits by tapping value-added product innovation and supply chain.

Livestock contributed approximately 58.3 percent to the agriculture value-added and 11.4 percent to the overall GDP during 2016-17 compared to 58.3 percent and 11.6 percent during the corresponding period last year, respectively. Gross value addition of livestock at constant cost factor of 2005-06 has increased from Rs.1,288 billion (2015-16) to Rs.1,333 billion (2016-17), showing an increase of 3.4 percent over the same period last year. Livestock has an important and crucial role in rural economy and rural socio-economic development. Nearly 8 million families are involved in livestock raising deriving more than 35 percent income from livestock production activities. It is central to the livelihood of the rural poor in the country. It is a source of cash income, providing a vital and often the only source of income for the rural and most marginal people. It can play an important role in poverty alleviation and foreign exchange earnings for the country.

The population growth, increases in per capita income and export opportunities are fueling the demand of livestock and livestock products in the country. The overall livestock development strategy aims to foster "private sector-led development with public sector providing enabling environment through policy interventions”. The regulatory measures are aimed at improving per unit animal productivity by improving health coverage, management practices, animal breeding practices, artificial insemination services, use of balanced ration for animal feeding, and controlling livestock diseases of trade and economic importance. The objective is to exploit the livestock sector and its potential for economic growth, food security and rural socioeconomic uplift.

**EMPLOYMENT**

Pakistan is the sixth most populated country in the world with an estimated population of 199.71 million. The estimated population growth and fertility rate is 1.86 and 3.0 respectively. Agriculture is the lifeline of Pakistan’s economy accounting for 19.5 percent of the gross domestic product, employing 42.3 percent of the labour force and providing raw material for several value-added sectors.

Dairying in Pakistan is labour-intensive and engages a large number of agents along the value chain, including farmers, thousands of milk collectors, transporters, processors, distributors and retailers. The input and services industry also provides employment to a large number of workers, including in the feed and veterinary supply chain.

**NUTRITIONAL SECURITY OF COUNTRY**

Livestock is rapidly growing in Pakistan and central to the livelihood of its rural people. The subsector plays an important role in national food security & rural economic uplift. Livestock sub sector particularly generates daily cash income for about 8.5 million small farmers and landless families. It also provides safety net for poor and self-employment opportunity for women. Pakistan is among the top 5 producers of milk with an estimated production of 52.6 million tons annually.
Despite the huge cattle population of 72 million cows and buffalos, Pakistan imports dry milk and other dairy products. Low productivity per animal and seasonality of milk production are the main causes behind imports. 90 percent of the total milk produced enters the marketing channels from subsistence farmers and five percent is processed as dairy pack products. There is a need for a decreasing yield gap in milk production through genetic interventions and improved breeding and feeding programmes utilizing local and exotic dairy breeds’ potential and maximizing fodder and forage production.

Policy Measures

I. Programmes for improvement of local animal breeds for enhanced milk and meat productivity
II. Special incentives for the private sector to invest in the dairy production
III. Promotion of dairy and feedlot fattening through commercial and corporate livestock farming segments
IV. Encourage value-added industry for livestock and livestock products with the aim to enter into global Halal food market
V. National Programs for risk based progressive control of trans-boundary animal diseases of trade and economic importance including Foot and Mouth Disease (FMD) and PPR (Peste des Petits Ruminants)
VI. Improved legal framework addressing legislative gaps, standards, grades, monitoring and enforcement to enhance national and international quality compliance
VII. Encourage provinces for improvement of veterinary health services, disease free zoning and livestock markets
VIII. Enhance training opportunities for milk and meat technology to develop a cadre of skilled human resource for modernization of the sector
IX. Upgradation and capacity building of National Veterinary Laboratory (NVL), National Reference Laboratory for Poultry Diseases (NRLPD), Animal Quarantine Department (AQD), and Livestock and Dairy Development Board (LDDB)
X. Coordination for the implementation of One Health programmes to manage zoonotic diseases for containment and eradication as well as controlling deaths and illnesses
XI. Strategies to increase fodder area and yield
XII. Animals and animal products export facilitation by developing infrastructure on cold chain and traceability aspects
XIII. Enhancement of duties on import of cheaper dry milk powder in order to protect the local dairy industry
XIV. The price of fresh milk may be fixed to provide incentive to dairy producers

Recognizing the need to protect the health of consumers, the Ministry of National Food Security & Research (MNFSR) has prepared a Bill which will pave way for the establishment of National Food Safety, Animal and Plant Health Regulatory Authority. The aim of the Bill is to ensure public health by enforcement of an effective quality food control system, including improving agricultural and animal husbandry practices, application of food technology to reduce chances of food borne diseases and improve the nutrition status of the population.
2. **Milk Production**

Table 1: Livestock population for the last three years is given in Table 2.21.

<table>
<thead>
<tr>
<th>Species</th>
<th>2014-15</th>
<th>2015-16</th>
<th>2016-17</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cattle</td>
<td>41.2</td>
<td>42.8</td>
<td>44.4</td>
</tr>
<tr>
<td>Buffalo</td>
<td>35.6</td>
<td>36.6</td>
<td>37.7</td>
</tr>
<tr>
<td>Sheep</td>
<td>29.4</td>
<td>29.8</td>
<td>30.1</td>
</tr>
<tr>
<td>Goat</td>
<td>68.4</td>
<td>70.3</td>
<td>72.2</td>
</tr>
<tr>
<td>Camels</td>
<td>1.0</td>
<td>1.0</td>
<td>1.1</td>
</tr>
<tr>
<td>Horses</td>
<td>0.4</td>
<td>0.4</td>
<td>0.4</td>
</tr>
<tr>
<td>Asses</td>
<td>5.0</td>
<td>5.1</td>
<td>5.2</td>
</tr>
<tr>
<td>Mules</td>
<td>0.2</td>
<td>0.2</td>
<td>0.2</td>
</tr>
</tbody>
</table>

Source: Ministry of National Food Security & Research

*Estimated figure based on inter census growth rate of Livestock Census 1996 & 2006*

Figure 1, 2: Milk production for the last 5 years (unit: 1000 Tonnes)
The Trade Councils of India, Pakistan and Bangladesh

Table 2: Per Capita Milk Availability is given below in the table:

| Table 2.6: Per capita availability of milk from supply side (million liters) |
|------------------|----------------|----------------|----------------|----------------|
| Production       | 37,383   | 38,582  | 39,819  | 41,098   |
| 55% consumed as fresh milk | 20,560   | 21,220  | 21,900  | 22,603  |
| Dry milk imported | 203.3    | 212.0   | 215.9   | 319.5    |
| Net availability | 20,764   | 21,365  | 22,116  | 22,851  |
| Per capita availability (liter/annum) | 114.91    | 116.26  | 117.63  | 119.18  |
| Per capita availability (liter/month) | 9.58     | 9.68    | 9.78    | 9.97    |
| Per capita availability (liter/day)    | 0.315    | 0.318   | 0.322   | 0.326   |

Source: This table is adapted from the Agriculture Statistics of Pakistan (GoP, 2011), Table 171 where this information is reported from 2003-04 to 2010-11 in tonnes. We use the same method to calculate per capita milk availability in liters based on the recent data obtained from the Pakistan Economic Survey 2014-15 (GoP, 2015). Data on dry milk import was taken from the State Bank of Pakistan’s website http://sbp.org.pk. One tonne of dry milk is taken as equivalent to 4 tonnes of liquid milk. We multiply values in tonnes with 1000 to convert them into kilograms. These values are then multiplied by 0.96835 to convert milk from kilograms to liters.

Regional Overview

The Food and Agriculture Organisation (FAO) of the United Nations says Pakistan is among the three countries in the Asia and Pacific region which are the world’s top dairy producing countries. According to latest figures published in Pakistan Economic Survey 2016-17, milk production in the country is on the increase and during the current fiscal year the gross production of milk was estimated to be 56,080,000 tonnes.

FAO warned that while dairy has big potential, the sector needs to be more sustainable and competitive in the Asia and Pacific region. This means helping smallholder farmers gain greater access to markets and services and develop successful dairy business models to increase domestic production.

The aim is to create a sector, which is socially responsible and produces safe and healthy food, making more efficient use of the natural resources and reduces the effects on the environment. Only by doing so, will the sector become more sustainable for the benefit of future generations. FAO remains committed to working with all stakeholders to achieve a dairy sector that contributes to health and prosperity of the world.

An Asia Pacific Regional Audit done by the International Osteoporosis Foundation has concluded that the average dietary calcium intake in Asia is well below the FAO-WHO recommendation of 1,000 to 1,300 milligrams per day and most Asian countries have seen a two-to-three-fold increase in the incidence of hip fractures during the past 30 years.
**3. Dairy Value Chain**

Big corporations have entered in the milk processing market as people are gradually moving towards packaged milk and other value-added dairy products. The current marketing system comprises of rural, urban, and processed milk marketing chains with various agents and dairy middlemen involved in each chain at every step. The milk supply chain involves various agents comprising milk producers, collectors, processors, and finally, the consumers. According to FAO (2011), around 80 percent of the dairy producers are smallholders operating at a subsistence level, 14 percent are medium sized producers and 3 percent are large-scale producers.

**Rural Marketing Chain**

In the rural supply chain, most of the milk produced is first used for domestic consumption and only excess milk is sold. The collection and distribution system is based on an interlinked network of collectors known as milk collectors (dodhis) who operate individually or in groups. These milk collectors enter into contracts with the milk producers, paying them a flat daily fixed price in order to guarantee daily production and also save themselves from seasonal price fluctuations. Especially in summer, as the retail price of milk increases, the milk collectors benefit from these fixed contracts as the price premiums are not passed on to farmers (FAO, 2011).

Milk is of a perishable nature and milk collectors buy it on the basis of quantity and not quality, putting it at a risk of spoilage. Furthermore, the weak infrastructure, lack of proper roads and cold chains makes it difficult to reach remote milk production areas (FAO, 2011). Moreover, there are hygienic concerns as well because the traditional milk collectors usually store milk in non-food grade and dirty containers while transporting them via donkey carts, cycles, motorbikes or trucks.

**Urban Marketing Chain**

The urban marketing chain relies on milk production in urban and peri-urban areas supplemented by the supply from rural producers. The peri-urban dairy farmers operate on the outskirts of large cities. In case of urban marketing chain, it is easy to access the consumers and usually there are no middlemen involved, enabling the milk man (gawalas) to produce as well as sell the milk and get a higher return.

**Processed Marketing Chain**

The milk processing industry has penetrated the urban market via introduction of new packaging and milk processing techniques by the private sector. The major products produced by the processing plants in the milk industry through the Ultra-High Temperature (UHT) process are pasteurized milk, tea creamers, ambient white milk, dairy drinks and beverages, among others. The processed milk industry relies on two kinds of supply chains: milk collection through third party suppliers and, self-collection from smallholder dairy producers, large dairy farms and corporate dairy farms. The self-collection system is now gradually replacing the third party supplier system as processing plants want to ensure that the milk is free from any form of adulteration.
4. DIFFERENT VALUE CHAIN SEGMENTS AND OPPORTUNITIES

GENETIC DIVERSITY

The three principal breeds are Nili, found mostly in Punjab Province, and Ravi and Kundi, found mostly in Sindh. Due to indiscriminate breeding, most of the herd is “non-descript”. Little is done to research or maintain the purity of buffalo breeds. The government has undertaken buffalo breeding projects at livestock research centres, but farmers are largely excluded from the results of this research, thereby limiting its benefits. Recently, there has been interest in improving understanding of the complex issues involved in buffalo reproduction.

The cattle population is slightly larger than that of buffaloes, but cows produce on average only about 55 percent of the yield of buffaloes. All Pakistan’s indigenous cattle are Zebu (humped type, Bos indicus). There are 15 recognized breeds in the country, of which Red Sindhi and Sahiwal are well known internationally as tropical dairy cattle breeds. Cattle have traditionally been bred to produce bullocks for ploughing and on-farm operations. A sizable population of cattle cross-breeds have recently emerged, and now represent 13 percent of Pakistan’s total cattle population. The productivity of dairy cattle cross-breeds is far higher than that of local non-descript or pure breeds, with longer lactation periods, higher milk production per lactation, and shorter calving intervals. These advantages make cross-bred cattle highly preferred for intensive and semi-intensive dairy farming systems. An average quality cross-bred animal costs almost 40 percent more than an average buffalo. Semen for cross-breeding programmes is imported from countries such as the United States of America, Switzerland, Canada, Germany and Australia by private sector firms.

FEED SOURCES

Two types of feeding practice prevail in Pakistan’s dairy production systems:

- In rural households, animals are closely integrated within rural subsistence economies and are fed grown fodders in the form of residuals and crops used as cut-and-carry livestock feed.
- In intensive and semi-intensive dairy farming around major urban markets, where mainly buffaloes are kept (but with increasing numbers of cattle cross-breeds), animals are fed on crop residues and other agro-industrial by-products. The use of green fodder depends on its economic availability.

More than half of animal feed is obtained from fodder and crop residues, one-third from grazing on rangelands, wastelands, canal banks and roadsides, and the rest from crops and their by-products. The country’s formulated feed industry is underdeveloped. Compared with an estimated annual demand of 40 million tonnes, only about 0.20 million tonnes is produced. This feed is also unaffordable for smallholders, and used by only market-oriented dairies, where it is available.
ANIMAL HEALTH

There are many fatal diseases in Pakistan including Foot and Mouth Disease (FMD), Parturient Hemoglobinuria, Bovine Viral Diarrhea (BVD), and black quarter. Farmers do not regularly vaccinate their animals against these diseases which lower dairy production. Every third cow/buffalo is suffered from mastitis, greatly contributing to loss of milk production.

Vaccines are available for a number of pathogenic contagious diseases like Peste des petites ruminant (PPR), Contagious Captive Pleuropneumonia (CCP) and Enterotoxaemia (ET). The large commercial farms usually practice vaccination and deworming to their goat flocks. However, the small and landless farmers get their animals treated after the appearance of disease in their flocks, and in most cases availability of vaccines are not available when needed. Usually the government supports the landless farmer free of cost vaccination in their flock. Recently, FAO has launched the Program in Pakistan on eradication of PPR. Under that Program, free of cost vaccine will be provided to small ruminant farmers in the country. Due to the tropical environment, the parasites are a major problem in goat flocks maintained on extensive and semi-extensive system. Farmers usually do the deworming by themselves mostly twice a year. In some part of the country particularly in Northern area, people use the leaves of the peaches and outer cover of pomegranate for the control of internal parasites in small ruminants.

DAIRY FARM MECHANIZATION

Corporate dairy farms structure their land in a way that they are able to ensure good quality housing and water facilities for their herds. Animals are housed using ‘free’ stalls in which cows are allowed to move freely, and are only restricted during milking. The shed has an adequate supply of drinking water and fodder, and the flooring is made out of rubber or sand. Electric fencing systems are also used to prevent cows from getting lost, attacked by dogs, or stolen. The handling of manure is more systematized and frequent in order to prevent diseases and insect infestations. Fans and cooling systems are installed to control the temperature inside the shed. Disinfectants are used liberally, and the animals are washed with clean water to maintain animal and, thereby, milk hygiene. There is a system of automatic suction pumps through which cows are milked and the milk is mixed and processed along with automatic and efficient milking alongside cleaning and drying of the teats and udders. Cows are tagged with transponders to identify them for milking, breeding and feeding. The collected fresh milk is then sent to a buffer tank for cooling. Since cooling helps avoid the formation of bacteria in fresh milk, corporate farms use more sophisticated cooling mechanisms in the form of immersion coolers and heat exchangers.

In comparison, conventional small-scale farms engage manual labour to manage their herds. Cows are usually tied up, and this leads to improper digestive balances. To feed the animals, farmers rely on fodder, which is seasonal in nature, but they cannot afford to purchase a chaffing machine (like modern farms) to chop down the fodder. Milking is done manually which often creates unwarranted time lags between demand and supply of milk. There is lack of fresh and clean water for the animals, which can be detrimental for their health. Small-scale farmers do not consult veterinarians as regularly and choose to rely on their traditional knowledge.
regarding animal disease. Their knowledge of the impact of excessive antibiotic use on milk quality is limited. While such farms have a lower up-keep cost compared to corporate farms, their milk production is restricted and the quality of milk is low. However, rural dairy farming practices have benefitted greatly in recent years from the awareness campaigns conducted by USAID in 2013.

5. **Milk demand & processing**

Milk is used for drinking, tea, yogurt and butter making. Milk is also used to make different types of sweets. Milk processing companies use milk as a raw material to formulate different types of milk i.e. pasteurized milk, UHT milk, condensed milk, skimmed milk, milk powder, etc. Different value-added products like yogurt, ice cream, butter and cheese are also produced from the raw milk.

**Milk processing**

To meet the demand of the growing population and increased urbanization, the processing of milk for a higher shelf life is important. Milk processing in Pakistan started in the mid-1950s but it got a boost as a part of development of the manufacturing sector in the country somewhere between the 1960s and 1970s.

The milk processing industry got another boost in 2000s when the demand for milk in the urban centres increased rapidly due to rising urbanization and improved per capita income. Continued and lengthy load-shedding also escalated the demand for the UHT milk. On the other hand, the research and development undertaken by the milk processing and packaging industries has lowered the costs of milk processing, the price differences between UHT treated and milk-owner (dodhies) supplied milk has reduced to 20% to 30%. Presently, 25 milk processing industries are engaged in the production of pasteurized milk, UHT milk, UHT cream, milk powders and ice cream. Among these, Swiss Dairy giant Nestle Pakistan has come into this sector in a big way, i.e. its daily milk processing capacity ranges from 2 to 3 million litres. It is worth mentioning here that almost the entire dairy processing sector is confined to Punjab Province only. But very few processing plants are located in the most buffalo-and-cattle-populated districts like Muzaffargarh, Sargodha, Okara, Rahim Yar Khan, Faisalabad, Bahawalnagar, Jhang and Kasur. All these districts have more than one million buffalo and cattle heads and contain about 35 percent of rural large ruminants farming (Government of Pakistan, 2012).

There has been a rising interest in the area of value-added dairy processing. Whether it is fluid milk or manufactured milk products, individual or group, many producers perceive an opportunity in adding value to their product by further processing or alternative marketing. In response to this rising interest, DairyCare Pakistan is the first company in Pakistan offering turn-key solutions of value-added milk processing and packaging for individual dairies.

Pasteurizing treatment consists on subjecting milk or other liquid to a thermal shock, which inactivates a big part of bacteria. This process allows a longer shelf life of such products. Upon standing for 12 to 24 hours, fresh milk has a tendency to separate into a high-fat cream layer on top of low-fat milk layer. The cream is often sold as a separate product with its own uses; today the separation of the
cream from the milk usually is accomplished rapidly in centrifugal cream separators. The fat globules rise to the top of a container of milk because fat is less dense than water. The smaller the globules, the more other molecular-level forces prevent this from happening. In fact, the cream rises in cow's milk much more quickly than a simple model would predict: rather than isolated globules, the fat in the milk tends to form into clusters containing about a million globules, held together by a number of minor whey proteins. These clusters rise faster than individual globules can. The fat globules in milk from water buffalo do not form clusters so readily and are smaller to begin with; cream is very slow to separate from these milks.

Top milk processing companies in Pakistan comprise of Dairyland, Engro Foods, Millac Foods, Nestle Milkpak, Friesland Campina and Shakarganj.

OPPORTUNITIES

Pakistan’s dairy sector presents immense opportunities for the entire value chain in the dairy sector as rapidly increasing population and high rates of urbanization are the driving forces of increased demand for fresh and processed milk and products.

6. DAIRY TRADE

The Ministry of Finance is reviewing a number of budget proposals (2017-18) of dairy sector including abolition of regulatory duty on the import of whey/milk powders, withholding tax exemption on milk, adjustable 7 percent sales tax on import of agricultural machinery and extension of zero rating of inputs to other direct and indirect material, including capital goods.

Sources told Business Recorder that the Ministry of Finance, the Federal Board of Revenue (FBR) and Pakistan Dairy Association (PDA) held meetings on the tax recommendations pertaining to the dairy sector to be considered in coming budget (2017-18). A set of proposals for the dairy sector is expected to be incorporated in Finance Bill 2017.

Industry recommended that the government was of the policy to grant zero rate sales tax status to milk and milk based products including raw milk produced by commercial farms, to keep the packaged products under the buying reach of the general public. Through Finance Acts 2015-16 and 2016-17, the zero rating sales tax status has been abolished and imposed reduced tax rate (10%) on goods such as concentrated (powder) milk, cream, yoghurt, cheese, butter and whey, whilst UHT and fat filled milk has been categorised as "exempt" under the Sales Tax Act 1990. Removing of zero rate tax policy has drastically increased the cost of the milk processing industry which eventually is resulting in the increasing trend of prices of packaged/hygienic milk and milk based products. Removal of zero rating policy is also hampering the growth and development of documented industry, resultanty the undocumented segment (fresh milk market) of the economy is flourishing.

The federal government imposed 25% regulatory duty on import of milk powder, which negatively impacted the dairy industry in general and 'infant formulae' in particular. Import of milk powder is intricate to cater the requirements of manufacturing infant formulae for which locally produced milk (fresh milk) alone cannot be used, due to the high sensitivity of the product. Import of milk powder
is also imperative for production of various other dairy products in the times of milk inadequacy; especially in summers known as lean period.

Thousands of exotic cattle have been imported from Australia, Europe and USA and are being managed by large-scale dairy farms to produce high quality milk locally. These animals require to be vaccinated for prevention of diseases and the majority of such vaccines are not available in Pakistan; thus require being imported. Currently, there is no provision of importing these vaccines legally. It is recommended that an easy procedure may be devised with the Drug Regulatory Authority of Pakistan to allow import of necessary vaccines by corporate dairy farms with an undertaking for using them at their own dairy farms.

**Table 3: The value of import** in the group of Food and Live animal

<table>
<thead>
<tr>
<th>Year</th>
<th>Month</th>
<th>Food and Live animals</th>
</tr>
</thead>
<tbody>
<tr>
<td>2016</td>
<td>Jan</td>
<td>24,612.9</td>
</tr>
<tr>
<td></td>
<td>Feb</td>
<td>19,382.6</td>
</tr>
<tr>
<td></td>
<td>Mar</td>
<td>26,432.2</td>
</tr>
<tr>
<td></td>
<td>Apr</td>
<td>22,051.6</td>
</tr>
<tr>
<td></td>
<td>May</td>
<td>28,683.3</td>
</tr>
<tr>
<td></td>
<td>Jun</td>
<td>27,429.0</td>
</tr>
<tr>
<td></td>
<td>Jul</td>
<td>22,292.1</td>
</tr>
<tr>
<td></td>
<td>Aug</td>
<td>26,657.2</td>
</tr>
<tr>
<td></td>
<td>Sep</td>
<td>25,436.2</td>
</tr>
<tr>
<td></td>
<td>Oct</td>
<td>27,008.0</td>
</tr>
<tr>
<td></td>
<td>Nov</td>
<td>27,711.3</td>
</tr>
<tr>
<td></td>
<td>Dec</td>
<td>26,680.4</td>
</tr>
<tr>
<td>2017</td>
<td>Jan</td>
<td>32,780.0</td>
</tr>
</tbody>
</table>


**7. Policy Environment and Government Support**

Livestock wing of Ministry of National Food Security and Research (NFS&R) with its redefined role under the 18th Constitutional Amendment continued regulatory measures that included 1) allowing import of high yielding animals, semen and
embryos for the genetic improvement of indigenous dairy animals, 2) allowing import of high quality feed stuff/micro ingredients for improving the nutritional quality of animal and poultry feed and 3) allowing import of veterinary, dairy and livestock machinery/equipment at reduced duty rates, in order to encourage establishment of the value-added industry in the country. Livestock insurance scheme for farmers having 10 animals or more, introduced during 2014-15 promoted cooperative dairy farming in the country. Zero rating on processed value-added chicken products has been withdrawn.

Livestock Wing regulated import of superior quality semen and high yielding exotic dairy cattle of Holstein-Friesian & Jersey breeds for genetic improvement of indigenous dairy animals. During 2016-17 (July-March), 556,565 thousand doses of semen and 9,123 exotic dairy cows were imported. The exotic dairy cows added approximately 70 million tons of milk per annum in the commercial milk chain/system.

In order to facilitate dairy farming, duty free import of calf milk replacer and cattle feed premix was allowed. During 2016-17 (July-March), 310.2 metric tons of calf milk replacer and 298.9 metric tons of cattle feed premix was imported. Similarly, to promote and encourage value-added livestock processing industry in the country, duty free import of machinery for milk, beef, mutton and poultry processing was allowed.

Moreover, to attract further investment in the dairy sector, protect the small dairy farmers and the corporate dairy sector, beside discouraging import and mitigate use of synthetic milk and recipe products, regulatory duties to the tune of 25 percent have been imposed on import of Skimmed Milk Powder (SMP) and Whey Powder (WP).

8. GROWTH DRIVERS

Future demand for dairy products is expected to rise rapidly due to reasons like:

i) Faster growth in population
ii) Increased urbanization and/or growth in absolute urban population
iii) The animal based products are required for fulfilling the protein and calcium requirements of the population on health grounds
iv) The income elasticity of demand for milk and meat is also greater than one, implying more than proportionate increase in demand for dairy products and meat than the rate of rise in income, therefore, better livelihood opportunities in livestock farming

Furthermore, the change in consumption patterns induced by globalization and general developments in the country (e.g. better quality milk and meat shops in urban centres, food streets, proliferation of restaurants and food vendors) is also expected to generate additional demand for livestock products including milk.
9. CHALLENGES/OPPORTUNITIES

Pakistan’s dairy industry is currently facing a number of problems like extensive commercial dairy farming, lack of dairy related education, lack of financial and infrastructure facilities especially to livestock farmers in deep rural areas. Moreover, lack of quality checks is the most neglected aspect of the whole system. In other words, there is no test at any stage along the informal marketing chain. On the other hand, due to increase in inflation and poverty levels, the majority of the consumers in Pakistan are price conscious and prefer buying raw loose milk compared to processed milk – making loose milk market dominant in the milk marketing system. Similarly, FAO (2011) recognizes seven issues of Pakistan’s dairy sector as:

i) Low animal productivity due to lack of proper livestock management practices and inaccessibility to support services
ii) Widespread adulteration due to the absence of an integrated cold chain
iii) Lack of coordination among smallholder dairy farmers in milk marketing
iv) Non-regulation of inputs prices and no control over inflation vis-à-vis control over milk prices by the local governments
v) Lack of reliable dairy sector by production systems, regions etc.
vi) Lack of export competitiveness of Pakistani dairy products
vii) Lack of policy support on most of the imported equipment for storage and processing

10. CONCLUSION AND FUTURE PROSPECTS

Future actions will continue to focus on:

i) Inter-Provincial Coordination for development of livestock sector
ii) Coordination with private sector to promote value addition livestock industry and diversification of livestock products
iii) Controlling Trans-Boundary Animal Diseases (FMD, PPR, Zoonotic diseases) of trade and economic importance through provincial participation
iv) Bringing more investments in livestock sectors
v) Exploring new markets for export of meat and dairy products with focus on Global Halal Food Trade Market
REFERENCES

http://www.fao.org/docrep/014/al750e/al750e00.pdf
https://www.researchgate.net/publication/303844033_Pakistan's_Dairy_Sector_Lessons_from_the_Past_to_Build_a_Resilient_Dairy_Industry
https://www.researchgate.net/publication/313316232_Milk_Supplies_in_Pakistan_Issues_and_Challenges_Facing_the_Dairy_Economy
http://dairycarepakistan.com/milk-processing.htm
http://fp.brecorder.com/2017/05/20170524181415/
TABLE OF CONTENTS

1. Introduction – Bangladesh and Bangladeshi agriculture ............................................. 37
2. Milk production .................................................................................................................. 37
3. Dairy value chain ............................................................................................................... 42
4. Different value chain segments and opportunities ......................................................... 43
5. Milk demand and processing ............................................................................................ 47
6. Dairy trade ......................................................................................................................... 49
7. Policy environment and government support ................................................................. 50
8. Growth drivers .................................................................................................................. 51
9. Challenges/Opportunities ............................................................................................... 51
10. Conclusion and future prospects ................................................................................... 52
**Bangladesh — A Growing Market**

**Demographics:**
Area (sq. km): 147,570
Demographics (2016):
- Total populations: 162.95 million
- Percentage of population under 25: 47.8%
GDP per capita in 2016: 1358.8 (World Bank, USD)
Economic structure (value added, GDP):
- Industry: 29%
- Agriculture: 15%
- Service: 56%
Imports of goods and services: 21%
Government: Peoples’ Republic of Bangladesh

**Top 8 reasons to do business in Bangladesh:**
- Stable growth rate: the average GDP growth is around 6 % for the last decade. This shows an expansion of 7.05% in November 2016 from the previous year.
- Growing economy: the country is emerging as one of the next great growth opportunities for foreign companies. Bangladesh was the 2nd fastest growing major economy of 2016, according to International Monetary Fund (IMF).
- Large number of population: the country has a large number of population of more than 162 million (approx.) which is growing towards 250 million in 2050, which means increasing and high potential for consumption.
- Middle and Affluent Class: 7% of Bangladesh population is classified as Middle and Affluent Class (MAC) Population which is projected to triple by 2025. This indicates a wider range of population with higher purchasing power and better consumption patterns.
- Middle income country: target to be a middle income country by 2021 resulting in a rising middle class, urbanization, increased demand for food and change in food patterns.
- GSP (Generalized System of Preferences): Bangladesh has been a WTO member since 1995 and gets GSP trade privilege from EU on everything excepting arms.
- Exclusive Economic Zones: the country has 710 km long coastline. The Exclusive Economic Zone in the Bay of Bengal expanded with 19,000 Km² opening up for deep sea fishing.
- Foreign Direct Investment (FDI) friendly Economic Zones (EZ): The Government aims at establishing economic zones in all potential areas in Bangladesh. The EZs could be established through Public and Private Partnership by local or foreign individuals, body or organizations.

**Dairy Sector**
Today the dairy demand is only met 43.5% (approx.) by local production. Increased industrial use and home consumption, deficiency in the local production, promotional activities and lower global prices of the milk powder etc., have geared up the import of milk powder in Bangladesh in the recent years. The dairy industry in Bangladesh is faced by several constraints that include poor genotype, limited feed availability, lack of quality feed, inadequate health care service, lack of cold chain, poor transportation and an unorganized marketing system. To meet up the deficiency of milk and milk products in a shortest possible time, the government and private organizations are putting efforts to enhance the present milk production status.
Opportunities for Danish companies

The Danish dairy equipment has already a footprint in Bangladesh for more than decades and Denmark is known as a high quality supplier already in the country. As the Danish food and agriculture industry has a long experience and is worldwide renowned for its high quality as well as efficiency and food safety issues, they can further intervene in the Bangladesh dairy sector which covers the whole supply chain.

Active Danish Companies in Bangladesh

The global dairy company Arla has been active in Bangladesh for more than 50 years. Some other Danish companies like Scanpro, Desmi, Christian Hansen etc. are active in Bangladesh in the relevant sector already.

1. INTRODUCTION – BANGLADESH AND BANGLADESHI AGRICULTURE

Bangladesh is basically an agrarian economy. Livestock, an essential component of the agricultural sector plays an important role in the national economy of Bangladesh. The contribution of animal farming sub-sector to GDP at constant price is 1.66% in FY 2015-16. Though the share of animal farming sub-sector is small, it makes a huge contribution to meet the daily essential animal protein in the form of milk and meat.

One of the most important economic activities in Bangladesh is milk production, providing 3.6 million (+) households with supplementary income. The income of a dairy farmer is low and usually ranging from BDT 30-60 (approx..USD 0.37 to 0.74) per day on an average, depending on the season. The dairy farmers both consume and sell their milk, generating income for the family. Less than 10 percent of the small farmers’ milk is sold through formal milk processing companies and more than 90 percent through informal channels, such as to neighbours or at the local market.

The dairy system in Bangladesh is characterized by small-scale operations, integrated with crops and other off-farm activities. Most workers in the industry are employed in small-scale milk production. In Bangladesh, about 45.9 percent households possess bovine stack and on average, each household owns 1.52 bovine animals, 0.9 goat and sheep. A typical milk farm in Bangladesh contains of two cows and has a very small piece of land to work on and produces milk at a much cheaper rate if compared to a farm in Europe.

Milk as a source of vital vitamins and minerals, is a crucial source of nutrition in Bangladesh which has one of the highest rates of under-nutrition in the world; 48 percent of Bangladesh’s children are chronically undernourished and 30 percent of the total population is below the minimum level of dietary energy consumption. The major source of milk as well as meat in Bangladesh is cattle; 90% of milk comes from cattle on an average.

---

1 Bangladesh Economic Review 2016
2 http://www.actionaid.org/sites/files/actionaid/milking_the_poors.pdf
2. **Milk Production**

A number of initiatives have been taken for livestock development. The most important ones relevant for the livestock section include: production and distribution of vaccine for poultry and livestock, artificial insemination extension programme by using both diluted and frozen semen for improved variety, increased production of semen, artificial foetus transfer technology, prevention and control of anthrax, foot and mouth diseases and avian influenza. After different initiatives, the total livestock population rose to 54.357 million in FY2015-16 from that of 52.836 million in 2011-12\(^4\). The total number of livestock population for the last five years is given below.

**Table 1/Figure 1: Growth of Livestock in Bangladesh (Million)**

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Cattle</td>
<td>23.195</td>
<td>23.341</td>
<td>23.488</td>
<td>23.636</td>
<td>23.785</td>
</tr>
<tr>
<td>Buffalo</td>
<td>1.443</td>
<td>1.450</td>
<td>1.457</td>
<td>1.464</td>
<td>1.471</td>
</tr>
<tr>
<td>Sheep</td>
<td>3.082</td>
<td>3.143</td>
<td>3.206</td>
<td>3.270</td>
<td>3.335</td>
</tr>
</tbody>
</table>

Source: Bangladesh Economic Review 2016

**Annual Milk Production**

Though the supply and demand gap is huge, the production of milk has been increasing over the past several years. The production statistics of milk for last five years is summarised in the graph.

\(^4\) Bangladesh Economic Review 2016
Figure 2: Milk Production during the last five years

<table>
<thead>
<tr>
<th>Year</th>
<th>Million Tons</th>
</tr>
</thead>
<tbody>
<tr>
<td>2011-12</td>
<td>3.46</td>
</tr>
<tr>
<td>2012-13</td>
<td>5.07</td>
</tr>
<tr>
<td>2013-14</td>
<td>6.09</td>
</tr>
<tr>
<td>2014-15</td>
<td>6.97</td>
</tr>
<tr>
<td>2015-16</td>
<td>7.27</td>
</tr>
</tbody>
</table>

Source: Bangladesh Economic Review 2016

In general, the majority of milk production comes from cattle followed by goats and buffaloes in Bangladesh.

Figure 3: Species-based milk contribution on average

PER CAPITA MILK AVAILABILITY

Sector insiders said the consumption of dairy products in Bangladesh was growing over the years though the per capita consumption still remained much less than that of the requirement. According to Food and Agriculture Organisation (FAO),
The present per capita consumption of milk per day in Bangladesh is maximum 150 millilitres (ml) as against World Health Organisation (WHO) recommended minimum daily intake requirement of 250 ml.

The overall per capita milk availability on the basis of total population and milk production during the last five years are given below.

<table>
<thead>
<tr>
<th>Years</th>
<th>Per Capita Milk Availability (ML/Day)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2011-12</td>
<td>60.93</td>
</tr>
<tr>
<td>2012-13</td>
<td>88.10</td>
</tr>
<tr>
<td>2013-14</td>
<td>104.67</td>
</tr>
<tr>
<td>2014-15</td>
<td>118.44</td>
</tr>
<tr>
<td>2015-16</td>
<td>122.32</td>
</tr>
</tbody>
</table>

Source: Calculation on the basis of total milk production and total population during the last five year

**SIZE OF DAIRY FARMS**

Cattle farming is a way of rearing cattle for profitable production of milk and meat. It is also a systematic way of cattle management which deals with proper feeding, breeding, and housing of the cattle and also taking preventive measures against diseases and parasitic infestations. However, in Bangladesh cattle is mostly reared as a component of traditional crop-based mixed farming or as a source of traction power and manure. The dairy farmers are mostly landless or smallholders in the country.

In Bangladesh the number of cattle per farm and system of cattle management vary with farm sizes. Four types of farms are generally recognised on the basis of number of the cattle (not on the basis of land holdings). The large farm size group usually has more cattle due to availability of more feed.
### Table 3: Farm size on the basis of the number of the cattle

<table>
<thead>
<tr>
<th>Size of the Farm</th>
<th>Number of Dairy Cattle</th>
</tr>
</thead>
<tbody>
<tr>
<td>Marginal</td>
<td>1-5</td>
</tr>
<tr>
<td>Small</td>
<td>5-10</td>
</tr>
<tr>
<td>Medium</td>
<td>10 - 20</td>
</tr>
<tr>
<td>Large</td>
<td>50 and above</td>
</tr>
</tbody>
</table>

Source: Bangladesh Livestock Research Institute, Ministry of Fisheries and Livestock

About 91% farmers fall under the category of marginal to small farms. 5% (approx.) farmers belong to the category of medium farms and the rest 4% goes under the category of large commercial farms.

### Table 4: Percentage of the farmers in different farm size

<table>
<thead>
<tr>
<th>Percentage of farmers</th>
<th>Farm Category</th>
</tr>
</thead>
<tbody>
<tr>
<td>91% farmers</td>
<td>Marginal and Small</td>
</tr>
<tr>
<td>6% farmers</td>
<td>Medium</td>
</tr>
<tr>
<td>4%</td>
<td>Large</td>
</tr>
</tbody>
</table>

Source: Bangladesh Livestock Research Institute, Ministry of Fisheries and Livestock

### A Small Dairy Farm in Bangladesh (Cross Breed Cattle)

Photo Courtesy: Department of Livestock Services, Ministry of Fisheries and Livestock, Bangladesh
Regional Production Dynamics/Overview

Though milk production is more in some areas of the country, geography wise information within the country on production dynamics as such is not available at the moment. Cattle are almost evenly distributed with a little higher concentration in northern part of the country. Buffaloes are mainly concentrated in the coastal areas of Bangladesh. It needs to be mentioned that though buffalo is an integral part of livestock production system in South Asian countries, in Bangladesh, the contribution of buffalo to total milk production is only 2.0%. Rather, goats have a bit more contribution which is around 8% of the total milk production.

3. Dairy Value Chain

Both formal and informal milk-marketing channels coexist in Bangladesh. The informal system is the largest, accounting for more than 90% of milk marketed. Milk producers or collectors (vendors or gowalas) bring milk for market sale. Price per litre in the organized market remains more or less stable throughout the year depending on the fat content. On an average, it is around BDT 42 to BDT 43 (approx., USD 0.52 to 0.53) if the fat content is 4%. But in the unorganized market, the price ranges from BDT 30 to BDT 60 (approx. USD 0.37 to 0.74) depending on the milk availability in different seasons. A major market for milk from local cows is the sweet shops which have a preference for its higher fat content (4% to more than 5%).

In the formal sector, milk collection is dominated by the farmer owned Bangladesh Milk Producers’ Cooperative Union Ltd. (BMPCUL – commonly known as Milk Vita), the Grameeen Mostsha and Pasusampad Foundation (GMPF), and other organized collectors such as Aarong, Pran, Amo-Milk, Aftab Dairy, Tulip, Bikrampur Dairy, and Savar Dairy etc.

5 Information through Milk Vita (BMPCUL)
The Trade Councils of India, Pakistan and Bangladesh

4. DIFFERENT VALUE CHAIN SEGMENTS AND OPPORTUNITIES

ANIMAL GENETICS

As 90% of the total milk production comes from dairy cattle, we would focus only on the genetics of cattle in this section. No specific cattle breed has been established as yet in the sector. But with the long natural selection some improved indigenous cattle varieties exist in the country like Pabna Cattle, Red Chittagong Cattle, Munshiganj Cattle, and North Bengal Grey Cattle. Their production potentiality is higher as compared to average overall performance of the common local cattle in Bangladesh.

Of about 23.7 million cattle heads in Bangladesh, most are non-descriptive indigenous Zebu (humped) type multipurpose animals. Among the total cattle production (approx. 23.7 million cows, 1.47 million buffaloes and 25.76 million goats) about 6 million are dairy cattle of which about 85-90 percent are indigenous and 10-15 percent are cross-bred. The main breeds of cows used for milk production in Bangladesh are: Holstein Friesian, Shahiwal, Jersey cross and Deshi/Local cattle. A mixed breed gives 6.5 to 8 litres of milk every day on an average while for a local cow it is around 1.5 to 2 litres only. But the fat contents for the local cows are comparatively higher than the other breeds.
Table 5: Milk Production and Fat Content by different breeds

<table>
<thead>
<tr>
<th>Breed</th>
<th>Productivity in litres/day (on an average)</th>
<th>Fat Content (%) – on an average</th>
</tr>
</thead>
<tbody>
<tr>
<td>Holstein-Friesian</td>
<td>10-15</td>
<td>3.5-3.8</td>
</tr>
<tr>
<td>Sahiwal</td>
<td>6-8</td>
<td>4 - 4.6</td>
</tr>
<tr>
<td>Jersey</td>
<td>8-10</td>
<td>4 - 5</td>
</tr>
<tr>
<td>Local/Deshi (Non descriptive Indigenous)</td>
<td>1.5-2</td>
<td>4 – more than 5</td>
</tr>
</tbody>
</table>

Source: Department of Livestock Services, Ministry of Fisheries and Livestock

Average milk production per cow varies depending on the season, the particular breed of cow and feed availability as well. Local/ Deshi cattle is by far the less productive of the breeds.

Table 6: Size of a local cow in general

<table>
<thead>
<tr>
<th>Body length (both sexes in average)</th>
<th>114-126 cm</th>
</tr>
</thead>
<tbody>
<tr>
<td>Height (same)</td>
<td>85-93 cm</td>
</tr>
<tr>
<td>Body Weight (average)</td>
<td>Cow-200kg</td>
</tr>
<tr>
<td></td>
<td>Bull -150 kg (may vary)</td>
</tr>
<tr>
<td>Milk production</td>
<td>1.5 kg to maximum 2.5 kg</td>
</tr>
<tr>
<td>Fat Content</td>
<td>4% to more than 5%, depending on the feed content</td>
</tr>
</tbody>
</table>

Source: Department of Livestock Services, Ministry of Fisheries and Livestock

**INDIGENOUS LOCAL CATTLE**

Photo Courtesy: Department of Livestock Services, Ministry of Fisheries and Livestock, Bangladesh
One of the main challenges for the local indigenous cattle is their low productivity. But the local variety has some good criteria, for example, resistant to diseases and parasites, efficient to utilize low quality roughages, and well-adapted to harsh environmental conditions. In Bangladesh, cross-bred cattle cannot achieve their production potentialities properly due to the harsh environmental conditions, non-availability of green fodder and forage, unskilled management, and lack of knowledge about health care. In fact, cross-bred cattle have a higher nutritional requirement and better adaptability than pure breeds. The pure exotic Holstein Friesians are found only in two local dairy farms in Bangladesh named as the American Dairy Limited, Dhaka and Nahar Dairy Farm, Chittagong\(^6\). Artificial insemination (AI) is being used in a smaller scale to improve the farm animals in Bangladesh. The total number of breedable cows at present is around 11.3 million (1 crore 13 lakh). Out of this, 45% are under the coverage of Artificial Insemination (cross breed). The remaining 55% are local animals, under traditional natural way of breeding\(^7\).

**Animal Feed and Feed Premix**

In an intensive agrarian country like Bangladesh, feed resources for ruminants are derived mainly from crop residues, cereal by-products, shrubs, fodder trees, and grasses growing in wayside bunds and embankment. In Bangladesh, rice straws and natural grass constitute traditional feeding of dairy cattle supplemented with little or no concentrates. Cultivated fodder includes both perennials, such as Napier, Para, German, Splendida, Andropogon, and Bamboo grasses; and seasonal crops such as maize, cowpea, khesari, oat, sunhemp, etc.

The available feed resources in Bangladesh are traditionally grouped into four categories as shown in the table\(^8\) below.

**Table 7: Traditional Feed Resources**

<table>
<thead>
<tr>
<th>Categories of Traditional Feed Resources</th>
<th>Ingredients and Characteristics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Forages</td>
<td>Including grasses and tree leaves</td>
</tr>
<tr>
<td>Crop residues</td>
<td>Highly fibrous, low in crude protein and deficient in fermentable energy and minerals</td>
</tr>
<tr>
<td>Agro-industrial by products</td>
<td>Less fibrous, more concentrated and generally have a high nutrient content</td>
</tr>
<tr>
<td>Non-conventional feed resources</td>
<td>Azolla, Sea-weeds, tomato pomace, water hyacinth, fruit waste etc.</td>
</tr>
</tbody>
</table>

To maximize the production, the dairy cattle need to be provided with sufficient amount of good quality diets. According to the Department of Livestock Services, the feeding system should contain 1/3 of dry roughage, 1/3 of green roughage and 1/3 of concentrate.

---

\(^6\) Source: Bangladesh Livestock Research Institute (BLRI)

\(^7\) Department of Livestock Services, Ministry of Fisheries and Livestock, Bangladesh

The green forages for dairy animals are available in the monsoon. However, in the dry season and during flood the availability of green forage is very limited. Because of the seasons, the forage supply to animals in Bangladesh is fluctuating which result in a low average of milk yield of dairy animals.

The bulk of the roughages for ruminant feeding is derived from crop residues of rice, wheat, pulse, etc. Tree leaves, indigenous grasses, and cultivated fodder contribute little to the bulk. The total area for Bhadoi and Rabi fodder is about 6,312 ha, producing only about 47,000 m tons of fodder crops. Very little grain is available for feeding the animals in the country. It is estimated that about 190,000 m tons of grain is available for livestock feeding, contributing only about 15.7 percent of the total amount of concentrate feed.

**Animal Health**

Among the economic diseases, Foot and Mouth Disease (FMD) is considered to be endemic and transboundary animal disease for large (cattle & buffalo) and small (goat & sheep) animals in Bangladesh. This disease is prevalent throughout the year covering entire geographic location causing severe production loss and mortality in the dairy animal. This disease is a major barrier to export meat and meat product. The government is trying to prevent the FMD disease through vaccination. Vaccine (polyvalent) from both government and commercial source (imported vaccine from France, India) are being used for animal (cattle) immunization where the national coverage is around only 10 percent of total susceptible animal population.

Another economic disease in Bangladesh is Pesti Des Pettis Ruminants (PPR) prevalent in goat and sheep. However, national vaccine production is sufficient to control the disease. Among the zoonotic diseases, Rabies is the number one neglected zoonotic disease that transmits from animal to animal and to human. The vaccine production for animal immunization by the Department of Livestock Services is sufficient to prevent the disease. Another zoonotic disease Anthrax is more prevalent in the dairy zone (Sirajganj, Pabna, Tangail, Kushtia) both in animal and human. Department of Livestock Services produces 5 million doses anthrax vaccine for animal immunization which is sufficient to prevent the anthrax outbreak in animal. Among the parasitic diseases, Fasiliosis (liver fluke) infestation is endemic in Bangladesh especially in the low lying coastal areas and this disease is considered to be a significant economic parasitic disease in Bangladesh.

**Dairy Farm Mechanization**

The mechanization status of dairy farming as a whole in Bangladesh is not mentionable that way. Most of the farms practice indigenous systems in operation. Due to lack of knowledge and unfamiliarity, farmers do not accept machinery like milking machine, chopper machine etc. Installation of partial mechanization can contribute to convert indigenous into modernization with gross productivity of dairy farming systems in Bangladesh.

---

12p. Authors: Das, Ashish Kumar; Saha, Chayan Kumar; Alam, Md. Monjurul
The scope of the dairy farm mechanization includes farm building design and modernization, proper maintenance, milking, collecting and mixing feeds as well as producing fodder crops and proper utilization of farm spaces. Mechanized milking system of a modern dairy farm requires large numbers of high yielding dairy cow, efficient milking machine and skilled operators that reduce the drudgery of manual milking and milking time. Mechanization is also demanded for waste disposal (cow dung, urine, feed residue) and to make the farm environmentally friendly for the animals and workers. Recently, only a few commercial players have started introducing milking machines. The whole mechanization process has a huge opportunity for business in Bangladesh.

5. MILK DEMAND AND PROCESSING

There is a lack of an independent collaborative national body, to work on enforcing standards for high quality production and processing of milk in Bangladesh. The price of milk varies with demand and quality. On the local market the price is determined mainly by the fat content and seasonal availability.

With reference to the dairy supply chain in Bangladesh both informal and formal milk-marketing channels coexist in Bangladesh. Smallholder milk producers supply all the milk to the informal traditional market and a little amount of the milk to the formal processing market. Cooperatives and institutional diary enterprises collect milk from smallholders through primary village cooperatives and then process and distribute the milk to the major cities in the country. The only government supported dairy cooperative in the country is the Bangladesh Milk Producers’ Co-operative Union Ltd., commonly known as Milk Vita. They collect milk from farmers in the rural areas and sell those in the urban areas of Bangladesh. Currently Milk Vita has 34 chilling plants in operation\(^1\). In the private sector, BRAC also used to follow a co-operative model but recently they have started to collect the milk from the individual farmers directly in order to avoid any conflict of adulteration which might happen while collecting through a middle man. BRAC has 98 chilling centres in operation and 20 chilling points at the moment\(^2\). In the formal dairy sector, over 90 percent of the milk is processed as pasteurized packaged milk and 10 percent is processed into cheese, butter, ghee and milk powder.

The top 3 milk processors in Bangladesh are:

1) Bangladesh Milk Producers’ Cooperative Union Limited (BMPCUL), commonly known as Milk Vita with a market share of about 56% to 60% of liquid milk\(^3\). Milk Vita provides BDT 1.1 million (USD 13,583 approx.) for establishing a model farm and BDT 0.12 million (USD 1,481 approx.) for buying a cow\(^4\)

---

1\(^{1}\) Bangladesh Milk Producers’ Co-operatives Union Ltd.
2\(^{2}\) BRAC
3\(^{3}\) Bangladesh Milk Producers’ Co-operatives Union Ltd.
4\(^{4}\) www.thedailystar.net/round-tables/bangladesh-dairy-challenges-and-opportunities-1337251
2) Aarong Dairy – BRAC has piloted the digital fat testing system with Aarong Dairy. The fat based value assessment system is expected to enhance the quality and accountability of milk procurement by the processors.

3) PRAN Dairy - Pran Dairy has established dairy hubs in various districts for the purpose of milk collection and preservation. This is seen to have a significant role in strengthening their marketing channels.

Opportunities in processing, retail and consumer front such as product innovation, packing innovation etc.

Every day around 18 million litres of milk are produced all over the country, but only 7 percent of it is sold to milk processing companies and the rest at local markets. Despite being one of the highest densities of livestock in the world, the productivity of cattle in Bangladesh is far below the world average.

There is a huge scope in the whole supply chain in the dairy sector including:

1) Cattle feed production
Quality fodder increases the yield of fat content in milk. A balanced diet with sufficient nutrients is needed to improve the milk productivity of improved breeds of cattle. At the moment commercial cattle feed is produced from agro waste and by-products, herbal feed additives, concentrates and other nutrient supplements presents potential business as well as investment opportunities. In Bangladesh, dairy feed is exempted from VAT added tax (VAT) and import of dairy equipment is exempted from both VAT and customs duty.

2) Cold storage
In Bangladesh pasteurized milk can only be marketed with cold storages. The lack of cold storages in Bangladesh means that the pasteurized milk is only being marketed in urban areas. The producers require pre-cooling facilities near the dairy farms and cooling for transportation of dairy products.

3) Milk-fat scale
The current milk collection system in Bangladesh lacks some transparency and is object for conflicts between producers and buyers.

- Chilling plant producers mostly get paid on fat content of the milk, even though the measurement process is not reliable and often leads to conflict. Though some chilling plants have equipment to scale the fat percentage in milk, the equipment is often not calibrated correctly. Chilling plants and formal processors is an effective tool for value addition in the dairy value chain, but the sector needs better equipment to increase the accuracy on how prices are set.
- Moreover, the milk-fat percentage analysis performed by dairy processing companies is performed at chilling plants located far away from the dairy farmers and is based on the milk aggregated from a number of farmers and not the individual farmers supplied of milk. Since the milk-fat percentage is

---

15 www.thedailystar.net/round-tables/bangladesh-dairy-challenges-and-opportunities-1337251
16 www.thedailystar.net/round-tables/bangladesh-dairy-challenges-and-opportunities-1337251
the main factor in determining the price of milk in Bangladesh, there might be a demand for milk fat testing machine at village level.

- Import of dairy equipment to Bangladesh is exempted from VAT and customs duty.

4) **Artificial insemination**

Artificial insemination (AI) is a technique to improve the genetics in dairy animals. Proper insemination equipment could help develop the milk production in particular through improved breed in large and thus could support the dairy sector development in general. There is a huge untapped investment opportunity in the AI area.

6. **Dairy Trade**

Bangladesh does not export milk as such. Due to huge demand and supply gap in the current domestic milk production, the country imports milk powder to meet the shortage in milk supply. Every year, Bangladesh imports 65-70 thousand metric ton milk powder, equal to 1.7 million litres of liquid milk, worth 2 to 2.5 thousand crore taka (USD 250 million to USD 312.5 million approx.) on an average. With growing domestic demand for dairy products, a number of companies are importing non-fat dry milk powder to meet the demand.

The country imported milk worth USD 223 million during the FY (Fiscal Year) 2011-12, followed by USD 218 million in FY 2012-13, USD 199 million in FY 2013-14, USD 233 million in FY 2014-15 and USD 207 million in FY 2015-16, according to the central bank figures.

Bangladesh has increased its import of milk powder as compared to what it was few years back. This is due to the industrial use and increased home consumption as the industry operators say.

**Figure 6: Import of milk powder**

![Import of Milk Powder](chart)

Source: Bangladesh Bureau of Statistics
About ten years back in 2006-2007, the import was only 24,000 tons whereas it was 105,683 tons during the last FY\textsuperscript{17}. The majority of import is accounted for skimmed milk. The average annual consumption of skimmed milk was 35,000 tons in 2013-15. This is projected to increase to 49,000 tonnes by 2025\textsuperscript{18}. The rise of powdered milk import is a worry for the local farmers as they consider it as a challenge for the development of the local dairy farming and the development of the industry.

7. Policy Environment and Government Support

The government has prepared a draft of the proposed National Dairy Development Policy (NDDP) 2016, which is being formulated to help develop the sector in an organised manner. Some of the suggestions are:

- Introducing organised milk marketing system, and setting up of milk chilling plants to strengthen the value chain at the grass roots level and ensure benefits for the farmers.

- Creating an ecosystem where all the stakeholders could smoothly interact and support each other.

- Facilitating coordination among the operators like farmers, collectors, milk traders and dairy processors, and supporters such as livestock health workers, input suppliers, and government and non-government institutions of the value chain.

- Increasing meat production, poultry development; ensuring veterinary services and animal health, feeds and fodder management, breeds development, proper management of hides and skins; proper marketing of livestock products.

- Formation of a national dairy board.

The government has also taken initiatives to train the dairy farmers at the grassroots level. Around 1.2 million farmers have so far received training on dairy production\textsuperscript{19}. With the Bangladesh Bank support, small farmers are also getting loans at low interest rates for cow rearing. The government is also providing support to the small scale dairy farmers through the Department of Cooperatives under the Rural Development and Co-operatives Division. A farmer can get loan maximum up to the level of BDT 0.12 million (USD 1,483 approx.). To boost up the sector, the government is now making big investment in establishing instant milk powder plant/s and upgrading the existing one/s.

\textsuperscript{17} Bangladesh Bureau of Statistics (BBS)
\textsuperscript{18} OECD-FAO Agricultural Outlook 2016-2025
\textsuperscript{19} Director General, Department of Livestock Services, Ministry of Fisheries and Livestock, Bangladesh
8. GROWTH DRIVERS

Bangladesh has a growing population of more than 161 million and the middle class is growing rapidly. Some of the growth drivers are:

- Population is expected to grow further, expected to be more than 250 million by 2050
- Fast pace urbanization
- Change in consumption pattern
- Growing middle class with higher purchasing power and better awareness. Currently Bangladesh’s MAC population is 7% and is projected to triple by 2025, to 34 million
- Introduction of UHT milk, milk powder, yogurt, flavoured milk products and other popular product varieties by dairy enterprises
- Introduction of aseptic milk packaging leading to longer shelf life

9. CHALLENGES/OPPORTUNITIES

The dairy sector of Bangladesh is affected by number of challenges and constraints, for example:

- Limited knowledge and technical skills of smallholder dairy farmers
- Lack of awareness about hygienic practices of cattle rearing
- Scarcity of feeds and fodder
- Poor quality of feeds
- Frequent occurrence of diseases
- Limited coverage of veterinary services including poor diagnostic facilities
- Lack of credit support, very limited access to financial services
- The existing government support covers only 50%-60% of the sector due to resource constraints
- Limited milk collection and processing facilities and low prices at collection points
- Lack of insurance coverage; though there is a clause in the proposed policy, there is no insurance coverage as such in action at the moment
- Absence of market information
- Lack of quality breeds
- Lack of knowledge about breeding and cross breeding
- Absence of a regulatory body
- Lack of efficient service management system. The existing service providers (Livestock Health Workers) can meet only 50% of the necessary services
10. Conclusion and Future Prospects

The National Dairy Policy is waiting final vetting. The policy is expected to help develop the sector in an organized way. An organized dairy industry would have a great potential to contribute to achieve sustainable development goals and alleviate poverty. In Bangladesh, the farmers mostly suffer from lack of proper marketing facility. An organized milk marketing system will help address this problem. It is also needed to have a single contact point for processing and commercialization which is critical for ensuring proper coordination among various operators of the dairy value chain. There is also confusion in setting standard for dairy products. The current practice in Bangladesh is to follow the BSTI (Bangladesh Standard Testing Institute) for testing the product standard. But the Safe Food Act requires a different standard than BSTI. This situation often creates confusion and hassles for the processing industry. There needs to be a single standard testing mechanism for dairy products.

The private sector has a big role to play in the dairy sector as it has lead the poultry and fishery sectors. It is expected that involvement of the private sector might attract more companies to invest in the dairy sector.

Opportunities for the Danish Companies

To meet the present huge demand supply gap in the dairy sector, milk production needs to be increased by several folds. The whole supply chain in the dairy sector has huge opportunities for business in Bangladesh including genotype, quality feed, proper health care services, cold chain, transportation and infrastructural development, etc. As Denmark has long experience of working in the dairy sector, Bangladesh dairy sector would be a very good opportunity for the Danish companies/business organizations to look into the market for their future business expansion. Presence of some big Danish players, for example: Arla, Desmi in Bangladesh emphasizes the opportunities for further business expansion activities for the Danish technology covering the whole supply chain including cultures, enzymes, packaging, dairy farm mechanization as well as the whole range of equipment in the sector. It is the time to realize that Bangladesh is a big market for business expansion with huge investment opportunity in the dairy sector.
REFERENCES

Bangladesh Economic Review 2016
Statistical Year Book Bangladesh 2015
National Livestock Policy 2007
Department of Livestock Services
Bangladesh Livestock Research Institute
Rural Development and Cooperatives Division
Bangladesh Agricultural University
Bangladesh Milk Producers’ Cooperative Union Limited/Milk Vita
BRAC Dairy
PRAN Dairy

http://www.academia.edu/5378144/Milk_production_trends_and_dairy_development_in_Bangladesh
http://www.lrrd.org/lrrd26/10/hami26179.htm
http://www.thedailystar.net/round-tables/bangladesh-dairy-challenges-and-opportunities-1337251
http://www.unsiap.or.jp/e-learning/el_material/Agri/1606_Advocacy_KOR/cr_Bangladesh.pdf
http://www.thedailystar.net/business/import-powdered-milk-almost-doubles-1444687
The Trade Council is a part of the Ministry of Foreign Affairs and is the official export and investment promotion agency of Denmark. The Trade Council benefits from around ninety Danish Embassies, Consulates General and Trade Commissions abroad. The Trade Council advises and assists Danish companies in their export activities and internationalisation process according to the vision: Creating Value All the Way. The work in the Trade Council follows specific procedures and quality guidelines. In this way our customers are secured the best possible quality under the varying working and market conditions at any given point of time.