Chapter XX
Dairy processing and farming in Nepal

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Summary
According to the Agricultural Perspective Plan growth of the dairy sector will accelerate from 2.9 percent to 5.5 percent by the end of the Plan period. Nepal is a net importer of milk and milk products. In the past decade the private sector increased its presence in a dairy industry which was dominated by the state owned DDC. Farmers are still facing “milk holidays” and milk and milk product imports are not decreasing. To sustain and further improve the dairy processing industry in Nepal, it must become competitive in terms of cost of production and quality. Trained manpower should be available to the private sector, raw milk pricing should be based on the quality and fixed by a free market system with little intervention from the government. Extension services should be backed up with more research and animal health support to increase the productivity of the dairy animals and product quality. Government policy should encourage the private sector to diversify products in collaboration with or in joint venture with the external partners from developed counties to explore the export market using their brand names and diversified quality products.

Livestock accounts for nearly a third (29.8%) of the country’s agricultural domestic products (AGDP) (ICIMOD/MENRIS/ CBS, 2003). According to the Agriculture Perspective Plan (APP) growth in the sector will rise from 2.9 percent to 5.5 percent by the end of the Plan period. Dairy farming accounts for about two thirds of the livestock sector. The average growth of milk production over the last decade was about 2.6 percent per year (Pradhan et al., 2003). In 1995-96 Nepal introduced agriculture-led economic growth and rural poverty alleviation by implementing the twenty-year Agriculture Perspective Plan which envisages reaching an annual growth rate of 5.5% (Chapagain, 1995).

Nepal is a net importer of dairy products; imports were 11 600 tons in 1999. Ghee is the only milk product that has been exported in significant quantities in the last decade; about 900 tons were exported to India in 1998. Globalisation of trade by large multinational processors is the emerging characteristics of the dairy industry and leads to increased competition in the market. Dairy-exporting developed countries have lower costs of production than developing countries and also provide export and production subsidies. Nepal is preparing to enter the World Trade Organization (WTO) and South Asia Free Trade Agreement (SAFTA), which will potentially open markets in the South Asia Region. Nepal will have to compete aggressively on price.

Dairy farming in Nepal is dominated by small farmers, so the cost of production is generally 10 - 20 percent higher than in India. There is some potential to export milk to West Bengal and Bangladesh (which are milk deficit areas throughout the year) but would require good quality, export volume and stability in supply throughout the year. The road network in the country is increasing at the rate of 200 km annually and every additional km of road can be expected to add about 36 tons of milk yearly (NDDB, 2001). In Nepalese farming, there are lean and flush seasons in milk production due to feed availability and the seasonal breeding pattern of buffaloes.

Brief history of development of the dairy processing industry in Nepal
Modern milk processing began in the early nineteen-fifties with the introduction of Swiss alpine cheese making technology to the high mountains (Upadhyaya, 2001) which led to the establishment of a cheese factory in Langtang, Rasuwa district, with financial assistance from New Zealand and technical assistance from FAO. Around the same time, a small milk processing plant was established at Kharipati, Bhaktapur. These plants started milk processing and marketing from 1958. By 1960 pasteurised milk in aluminium foil-capped bottles was on sale in Kathmandu (Upadhyaya, 2001). Butter in consumer packs, cream, yoghurt and ice cream were introduced later by the government owned Central Dairy at Lainchour. A Dairy Development Corporation (DDC) was established in 1969. Before becoming a corporation it had carried out dairy development activities in a wider area as the Dairy Development Board.

To meet the increasing demand for processed milk and dairy products the DDC established more milk supply schemes: Biratnagar Milk Supply Scheme (BMSS) in 1973 in the eastern region, Hetauda Milk Supply Scheme (HMSS) in 1974 in central region, Kathmandu Milk Supply Scheme (KMSS) in 1978 in central region, and Pokhara Milk Supply Scheme (PMSS) in 1980 in the western region. These schemes were involved in both the collection and processing of milk and milk products. In 1981 under the DDC, Milk Producers’ Associations (MPAs) were established to increase the participation of farmers in dairy development in an organized way. Later the MPAs were transformed into Milk Producers’ Cooperatives (MPCs). Presently there are about 1 000 MPCs and their milk sales in 1998-99 were 1 778 829 litres. A skim milk powder plant with 1 000 tons per day capacity was established in Biratnagar on the recommendation of the Ten Year Dairy Development Plan (1991-2000). In 1992, HMG Nepal established a National Dairy Development Board (NDDB) to assist dairy development.

In the late nineteen-seventies private entrepreneurs began to establish small processing units in the Kathmandu valley. There are more than 200 private dairies of various scales in operation all over the country; their market
share has increased continually from 33 percent in 1991-92 to 40 percent in 1998-99 (NDDB, 2001). Cheese production by the private sector is about 224 tons per year which is more than that produced by DDC (176 tons).

**Brief history of development of dairy farming in Nepal**
Prime Minister Jung Bahadur Rana initiated dairy development activity with the importation of European cattle from the UK in 1917. The first Livestock Development Farm was established in the Livestock Improvement Section under the Department of Agriculture in Singha Durbar, Kathmandu. The main development stages in dairy farming are presented in Table 1.

<table>
<thead>
<tr>
<th>Year</th>
<th>No. of dairy animals brought into Nepal</th>
<th>Origin</th>
</tr>
</thead>
<tbody>
<tr>
<td>1953</td>
<td>Red Sindhi cows- 20, Bull-2</td>
<td>Pakistan</td>
</tr>
<tr>
<td>1957</td>
<td>Brown Swiss cows-8, Bulls-2</td>
<td>American Heifer Project</td>
</tr>
<tr>
<td>1958</td>
<td>Jersey Bulls – 2</td>
<td></td>
</tr>
<tr>
<td>1960</td>
<td>Starting of artificial insemination in Kathmandu Valley (Semen from different breeds of Bulls)</td>
<td></td>
</tr>
<tr>
<td>1965</td>
<td>Jersey cows- 13, Bulls-2</td>
<td>Society for Those Who Have Less</td>
</tr>
<tr>
<td>1967</td>
<td>Murrah buffalo male-1, Female-40</td>
<td>India</td>
</tr>
<tr>
<td>1971</td>
<td>Murrah Buffalo-11</td>
<td>India</td>
</tr>
</tbody>
</table>

*Source: Shrestha, 2002.*

HMG established two dairy cattle farms, one in Jiri-Khimti and the second at Khumaltar and three buffalo farms in Tarahara, Rampur and Pokhara. Presently a number of improved buffaloes, especially Murrah and Murrah x local crosses, and cattle mainly Jersey, Holstein-Friesian, Brown Swiss and Ayrshire crosses, have been imported from India, New Zealand and other countries. Though the milch buffalo population is barely higher than that of milch cows, their volume of milk is more than double (Table 2). This shows higher milk productivity of buffalo since most cows are local landraces with a milk yield of 400 litres per lactation. Artificial insemination services for cows and buffalo have been widened in 46 districts to cover 12.26 percent of breeding cows and buffaloes (ABD, 1996).

<table>
<thead>
<tr>
<th>Year</th>
<th>Milch cows and buffaloes, total milk production and productivity, 1999</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cow</td>
<td>Buffalo</td>
</tr>
<tr>
<td>Mountain</td>
<td>101</td>
</tr>
<tr>
<td>Hill</td>
<td>448</td>
</tr>
<tr>
<td>Terai</td>
<td>279</td>
</tr>
<tr>
<td>Total</td>
<td>828</td>
</tr>
</tbody>
</table>

*Source: Ministry of Agriculture 1999.*

Yak and chaures are raised exclusively on grazing in the mountains, with herds moving up and down according to the season. Cows and buffaloes are kept on-farm in sedentary systems. Improved cows and buffaloes are stall-fed. There is a growing trend for commercialisation of dairy farming in and near areas where markets have developed and/or are developing rapidly. There is growing awareness among farmers of the need for improved management particularly where the milk marketing network has reached. There are however problems of inadequate feed and fodder, poor animal health services and inadequate training and extension services.

**Milk processing technology**
Available dairy technology can be divided into two different categories:
- Traditional indigenous technology of Nepal and India.
- Imported western technology.

**Indigenous technology of Nepal and India**
Consumption of milk and dairy products is a part of Nepalese culture. Dahi (curd), ghee, chhurpi, khoa and khoa-based sweets are the main traditional commercial dairy products; mohi and khir are non-traditional dairy ones.

**Dahi** (curd) is one of the main traditional milk products, widely used in the household. Dahi and yoghurt, similar looking but different products, are interchangeable in the Nepalese household. Even to-day vendors sell dahi in the streets or markets in single-use clay pots. Dahi is made from milk by boiling it then coagulated it by using yoghurt or a traditional curd culture. It is sold either with full fat at special price or churned out at lower prices. Most private dairies are involved in dahi production. According to International Dairy Federation (IDF,2000) yoghurt/dahi production in Nepal in 1999 was 2 000 tons.

**Ghee (clarified butter)** is by far the most important dairy product and a very important source of income for dairy farmers who cannot sell fresh milk. It is prepared by heating butter to 110 °C when almost all the moisture is driven off. It is then filtered, packed in proper containers and marketed. It is major exportable dairy product. In the last five years, ghee packaging improved and it is now packed in plastic containers, plastic pouches and
laminated aluminium bags. Demand for ghee is met by the formal and informal dairies. DDC leads the market in ghee followed by private dairies and imported brands.

**Chhurpi** is made by boiling and precipitating the proteins from butter milk obtained after churning butter from coagulated milk of yak/chauries or even the cows. The product is dried, cut into different shapes and sizes and sold in local markets. It is either produced at the farm level or by small-scale entrepreneurs. No data are available on the amount of chhurpi produced.

**Khoa** is another milk product used as raw material in making traditional sweets. It is a heat concentrated milk product, prepared by continuously heating and evaporating milk, until it is semi-solid and the fat content is about 40%. The khoa market is very seasonal and totally dependent on festival seasons. More than 60 percent of khoa sold is believed to be imported from India.

**Chhena** is a heat and acid coagulated milk product. It is the base material for the preparation of Paneer, Rashbari and other sweets.

**Imported western dairy technology**

Many technological advances have been taken place in the production of dairy products and packaging for longer shelf life. At present in Nepal products from western dairy technology are pasteurised milk, cheese, butter, ice-cream, UHT milk and milk chocolate.

**Pasteurised milk** is the main product of the dairy industry involving more than 95 percent of the milk handled by processing plants in the country. It is the commonest milk product consumed in the major urban areas.

**Cheese** is the second most important milk product of Nepal’s dairy processing industries. Two main types of cheese are produced: yak cheese and kanchan cheese (cow). Estimated production in 1998 was 401 tons with about 206 tons of yak cheese and 195 tons of kanchan. About three fourths of yak cheese and a third of kanchan cheese was produced by the private sector. The market for mozzarella cheese is growing in urban areas due to an increasing number of pizzerias and restaurants. Major private dairies make mozzarella.

**Butter** is produced by major milk processing industries. About 1 000 tons of butter is made annually in Nepal and is mainly consumed in urban areas, hotels and restaurants. It is marketed either as table butter in retail packs or bulk butter for bakeries or ice cream manufacturers. Butter is also imported from India and third countries. Nepalese products have a comparable price with the Indian table butter brand Amul. Packaging of Nepalese butter is poor so it has a short shelf life.

**Ice cream** is an emerging dairy product in Nepal. Ice cream parlours are becoming common in major cities. Estimated annual ice cream production from DDC and private sector is about 1 000 tons and the main market is Kathmandu valley and Pokhara. Eighty three percent of ice cream production is in the private sector followed by imported brands from India.

**Milk Powder** A significant amount of milk powder (about 6 000 tons) is imported. DDC is the only producer of skim milk powder, producing 600 tons for its own use. The use of milk powder is necessary due to seasonal fluctuation of milk availability and to supply smoothly all the year round to the customers.

**UHT milk** is sterilised milk with a shelf life up to six months at ambient temperatures. The use of UHT milk is of importance in countries like Nepal due to ease of storage without deterioration. It is still in the initial stage of production and marketing and UHT milk in Nepal is gaining slowly in popularity.

**Major issues in dairy development**

**Milk holidays.** The processing sector (DDC and private) has a limited capacity to absorb all the milk offered by dairy farmers especially during the flush season. The terminology “Milk Holiday” is used for the days on which milk is not bought from the producers. This is one of the most important problems faced by the milk producers. Milk holidays have grown to 2 - 3 days a week and it seems that it may continue even in the lean season. At present the amount of uncollected milk is very small, about two percent of the total offer, but it may increase further if the efforts for the increase in processing capacity and the consumption are not pushed forward. At present the trend for milk offer is (14%) higher than the consumer’s demand trend (8%). To upset the balance further, the increase in road network will add more milk on offer to the market.

**Calving pattern in buffaloes.** There are seasonal calving patterns in buffaloes and in the availability of fodder. Most of the buffaloes calve during August to October when most of the milk holidays takes place. The breeding of the buffaloes should be changed to alter calving time and the milk holiday could be solved to some extent. Research is needed on changing the calving pattern so that the flush season can be minimized.

**High cost of milk production.** Dairy farming in Nepal is still dominated by non-commercial farmers, so the production cost of milk is generally higher than in neighbouring India. Due to free entry of milk and milk products into Nepal, the dairy sector should have to produce milk at a competitive price. Even within Nepal, commercial farmers raising more than three buffaloes or five cattle are producing milk at a lower cost than the farmers rearing a single animal. It is possible to reduce production cost by improving management through better feeding, breeding and health care. In the milk pocket areas of Chitwan district farmers could not maintain animals that produced more than 15 litres of milk daily due to constraints in their feed resources and lack of knowledge in improved management.

**Lack of diversification.** Product diversification has been very limited in Nepal. Less than 5 percent of milk collected is converted to other dairy products and most of the processing industries depend on the pasteurising
milk for immediate consumption. Recently, a private entrepreneur started producing UHT drinking yoghurt, and UHT milk is soon to come on the market. Due to the present low rate of return the private sector is not prepared to invest in the diversification of dairy products.

**Poor quality of raw milk.** Most dairy farmers keep their animals under poor management conditions; they milk their stock and store raw milk within the farm premises in unhygienic conditions, then transport the produce in unhygienic ways, which affects its quality. Milk Producers Cooperatives and Chilling Centres only test milk quality by reading the fat and SNF percentages. To produce quality milk products for the market or even for export, milk quality should be maintained strictly from the farm right up to the processing stage and that will demand awareness from producers as well as processors.

**Shortage of trained personnel.** Inadequate trained manpower in the field of dairy technology is a major problem, especially in the private sector, so entrepreneurs are unable to produce appropriate milk products in terms of product and price. Producers should be trained in diversification of their products to minimize the effect of milk holidays.

**Potential of the dairy processing industry**
Nepal is still in its infancy as far as modern dairying is concerned. Producers face the problem of milk holidays every year, which indicates a surplus of production, but on the other hand Nepal is importing huge quantities of skimmed milk powder and other dairy products. It is estimated that large quantities of milk products are imported in Nepal annually, compared to the total amount of milk that could not be purchased due to milk holidays (Table 3).

**Table 3. Milk products imported into Nepal**

<table>
<thead>
<tr>
<th>Commodity</th>
<th>Quantity imported (tons)</th>
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</thead>
<tbody>
<tr>
<td>Skim Milk Powder</td>
<td>6 200</td>
</tr>
<tr>
<td>Whole Milk Baby Food</td>
<td>3 000</td>
</tr>
<tr>
<td>Condensed Milk</td>
<td>2 000</td>
</tr>
</tbody>
</table>

*Source: Upadhyaya, 2001*

These figures indicate that 95 000 tons of milk equivalent is imported whereas the total milk not purchased due to milk holidays has only been 1 600 tons in 1998-99. Thus there is a tremendous opportunity for Nepal to diversify into producing value added milk and milk products to replace imports and explore the outside market. Milk processing industries like DDC, including private sector and cooperatives, handle 582 700 litres per day and only 72 percent of their capacity is utilized. So there is still 160 000 litres per day unused processing capacity.

The prospects for the product diversification are good and could be started even from simple and less expensive approaches, producing skim milk powder and flavoured milk and different flavoured ice cream and small sized cheese. The annual per capita milk consumption in Nepal is 49 kg, which is very low compared even to other south Asian countries. With aggressive market promotion for the consumption of milk and milk products the market can be further expanded by products diversification. For a developing country like Nepal, a business alliance or joint venture with partners from developed countries can improve the dairy sector in products diversification as well as export to neighbouring markets like Bangladesh and West Bengal.

**Future strategies for dairy development**
The future strategy for dairy development is to develop a competitive, sustainable, progressive and market-oriented industry in milk and milk products. The strategies should deal with issues of concern related to dairy development.

- **Pricing.** The pricing of raw and pasteurised milk should be fixed by free market forces with little intervention from the government. Payment for raw milk should be related to quality, season and location. There should be contractual agreements between the processors and farmers or MPCs so that smooth supply of milk and price is assured during the flush and lean seasons.

- **Quality improvement.** Standards for dairy products should be revised to a realistic achievable level with a goal of reaching the standard for export within ten years. Premium and penalty pricing system should be introduced and pricing should be based on the protein and fat level rather than current SNF and fat based system.

- **Expanding future milk collection.** Investment in new processing facilities should be encouraged outside the Kathmandu valley and to expand the market for milk and its products. Increase the investments in chilling centres and reduce the collection costs.

- **Reduction in cost of production.** Cost of production in Nepal is high relative to India and dairy exporting developed countries like Australia and New Zealand. Emphasis should be on the following main areas:
  1. Supply of suitable improved dairy stock.
  2. Adequate supply of feed and fodder throughout the year with emphasis given to nutritive balanced fodder-based feeding systems.
  3. From the point of total animal use buffaloes should be given priority.
  4. Production and collection in low cost producing area along the road corridor.
  5. Business alliances between commercial producers and private processors should be encouraged.

- **Product diversification.** The strategy is to support the private sector and, ideally, to form joint venture companies, which could contribute technical know-how, brand name and marketing support.
• Elimination of milk holidays
• Leave the prices to market forces and introduce adequate price difference between lean and flush season.
• Support the private sector in product diversification and better utilization of installed capacity.
• Through extension and price differentiation, encourage the farmers to have a more even production throughout the year.
• Change the breeding strategy to help to produce milk during the lean season.

• Export promotion. Remove or minimize constraints to export of dairy products and support the private sector with market information for export.

Conclusion
Nepal’s dairy processing industry and farming is a growing sector. Nepal’s long term Agricultural Perspective Plan prioritises the livestock sector in a strategy for rural poverty alleviation; dairying is the main component of that sector. With the ever increasing participation of the private sector in dairy processing and farming it plays an important role in the national economy. About 95 000 tons of milk equivalent, milk and milk products are imported yearly, this shows the potential of the milk and milk products market in Nepal. The main constraints to the development of the dairy sector are high production costs, milk holidays due to over production in the flush season, quality of milk and milk products, cheap imports of milk powder and dairy products from India and third countries.

Nepal’s dairy industry can flourish if the main constraints are tackled in a planned way. For rapid expansion of dairy processing as well as primary production, involvement of the private sector should be encouraged with the support of government organizations. To reduce milk holidays the producers should be encouraged to produce milk in the lean season through appropriate calving strategy and adequate feeding with incentive mechanisms of premium prices for the lean season. To target the export market the quality of the milk should be standardized and pricing should be based on milk quality and products should be diversified so that they suit the export market. Research and extension with animal health service should be strengthened to produce quality and cheap milk and milk products.

References