

PAPER NO. 7 TECHNOLOGY OF MILK AND MILK PRODUCTS

MODULE NO. 1

STATUS OF DAIRY INDUSTRY IN INDIA AND ITS FUTURE SCOPE

Introduction

India became the world's largest milk producer (> 140 million tonnes in 2014-15), outstripping the US almost 15 years ago. India's milk production accounts for 18.5 % of global milk production, with most of it consumed domestically. India accounts for < 1% of global trade. The per capita availability of milk in India stands at 289 g per day. Backed by strong domestic demand, the per capita availability of milk is anticipated to reach 336 g per day in 2017.

Growing at about 10% annually, the Indian dairy industry is predominantly controlled by the unorganised sector, which accounts for nearly 85% (ASSOCHAM). About eight crore rural families across India are engaged in dairy production and the rural market consumes over half of the total milk produced. Indian dairy sector is growing at 4.5% annually. Uttar Pradesh (23.33 million tonnes of milk), Rajasthan (13.94 million tonnes), Andhra Pradesh (12.76 million tonnes), Gujarat (10.31 million tonnes), Punjab (9.71 million tonnes), Madhya Pradesh (8.84 million tonnes), Maharashtra, Bihar, Haryana are the leading milk producing States in India for the year 2015.

In 2020, the milk production in India is expected to touch 191 million tonnes. The market size of dairy industry in 2010-11 was ₹ 2,92,067 crore, which is expected to reach ₹ 7,10,596 crore in 2017. The Non-fat dry milk (NFD) is expected to touch 4,89,000 tonnes in 2014. Combined butter and ghee (clarified butter) was expected to touch 4.88 million tonnes.

Milch animals – Indian asset

India has some excellent breeds. Among cattle, the Sahiwal, Rathi, Gir and Red Sindhi stand out as milk producers; for buffalo, the pride of place goes to the Murrah, Mehsani and Jaffarbadi. India has the largest cattle (185.2 million, 2.1 kg dairy yield/animal that contributes 38% of total milk production) and buffalo population (97.9 million, 2.6 kg dairy yield/ animal that contributes 54% of total milk production) in the world. Out of all bovine population in India, 40% are indigenous cows, 46% are buffaloes and 14% are imported European or North American cattle crossbreeds (6.9 kg daily yield/ animal). Indian average milk output per milch animal is just 1380 lit. vs. 2350 lit./animal/year for world average. India has 50% of the world's buffaloes and 20% of the world's cattle population. More than 67% of dairy animals are owned by marginal

and small farmers. Buffalo milk accounts for the largest share (~ 54%) of the total milk produced in the country; followed by crossbreds (24%) and indigenous cattle (22%).

Milk production is growing 7% by volume and about 5% by value. This progress is primarily attributed to structural changes in the Indian Dairy Industry (IDI) brought about by the advent of dairy cooperatives. The market size of Indian dairy industry was US \$ 100 billion in 2015.

Milk processing in India is ~ 35% of the total milk produced. Of this, the organized dairy industry account for 13% of the milk produced, while the rest of the milk is either consumed at farm level, or sold as fresh, unpasteurized milk through unorganized channels.

Allocation of milk for milk products

In India, about 60% of milk is consumed in liquid form, while the remaining 40% is used in the form of butter, clarified butter (desi ghee), cheese, curd, paneer, ice cream, dairy whiteners and traditional sweets. Of the milk produced, 40% is used or consumed on farm and 60% is sold. Of the milk sold, 70% goes through unorganized sector and only 30% via the organized sector.

About 50% of total milk produced in India is converted into traditional Indian dairy products. The consumption pattern of different milk products in India are as follows:

Table 1. Allocation of milk used for milk product manufacture.

<u>Commodity</u>	<u>Percent of total milk output</u>
Liquid milk	46.0%
Ghee and butter	27.5%
Butter	6.5%
Khoa and similar milk sweets	6.5%
Milk powder (including infant milk food)	3.5%
Paneer, chhana and cheese	2.0%
Ice cream and Kulfi	0.6%
Yoghurt/dahi	7.0%
Other dairy products	Rest

Factors affecting growth in milk consumption in India

- ✚ Population growth
- ✚ Greater affordability due to increased disposable income

- ✚ Increasing awareness and availability of dairy products through retail and food service segments
- ✚ Increased consumer interest in high protein diets

Factors impeding steady growth of dairy industry

- Low productivity of milch animals (i.e. 987 kg/year vs. 2200 kg/year as world average)
- An upward spiral in prices,
- Lack of proper infrastructure like cold storages
- Absence of a transparent milk pricing system
- Lack of fodder, results in low yield from cattle

Dairy development in India

Lot of initiatives has been taken to have upsurge in milk production. Some of the crucial initiatives that have led to development of Indian dairying are discussed herein under few heads.

Co-operative movement - The Anand Pattern

The first large-scale and systematic breakthrough in dairy co-operatives in India was made in 1948 by the Kaira District Co-operatives Milk producers Union Limited at Anand in 1946, referred to as 'Anand pattern' which has been replicated in other States too. Subsequently, the Kaira Cooperative Union established a marketing agency named Gujarat Cooperative Milk Marketing Federation, which follows a three-layer structure that collects, processes and markets dairy products at village, district and state levels. The district units also provide technical support to the milk producers and a range of services such as feed, veterinary care, artificial insemination, education and training.

Operation Flood

The National Dairy Development Board (NDDB), set up at Anand in 1965, drew up a program known as "Operation flood" (commenced in 1970) to replicate the Anand pattern in 18 areas of milk production in the milk sheds of Bombay, Delhi, Calcutta and Madras. The world's largest dairy development program the "Operation Flood" undertook the gigantic task of upgrading and modernizing milk production, procurement and marketing with the assistance provided by the world Food Program, European Economic Community (EEC), the World Bank and other international agencies. The major objective was to provide an assured market round the year to the rural milk producers and to establish linkage between rural milk production and urban market through modern technology and professional management. Further, it was meant to achieve vertical integration of milk procurement, processing and marketing through a three-tier co-operative structure. The Operation Flood was one of the world's largest rural development programs which ran for 26 years and eventually helped India to emerge as the world's largest milk producer. As part of the program,

around ten million farmers were enrolled as members of about 73,000 milk cooperative societies. The Operation Flood ended in April, 1996.

Dairy cooperatives account for the major share of processed liquid milk marketed in India. Milk is processed and marketed by 170 milk producer cooperative unions, which federate into 15 State Cooperative Milk Marketing Federations. Over the years, several brands have been created by cooperatives like Amul (Gujarat), Vijaya (Andhra Pradesh), Saras (Rajasthan), Nandini (Karnataka), Milma (Kerala) and Gokul (Kolhapur).

Milk and Milk Products Order (MMPO)

In 1992 the MMPO was promulgated under the essential commodities Act 1955 to regulate milk and milk products production in the country. During 2001, the Government made some important amendments in MMPO Act 1992, whereby the registration of units handling up to 1 lakh lit. of milk/day or 5,000 tones of milk solids per annum was granted by the concerned state Government. The requirement of renewal license was abolished, but the Government controls, regulations and licensing requirements restricted large Indian and multinational players from making significant investments in this sector. In March 2003, GOI abolished the restrictions on setting up milk processing and milk products manufacturing plants and removed the concept of milk shed, whereas requirements regarding to food safety and hygiene were retained in the MMPO.

National Dairy Plan

In 2010, the Government and the NDDDB drew up a National Dairy Plan (NDP – started in March 2012) that proposes to nearly double India's milk production by 2020. This plan endeavours to increase the country's milk productivity, improve access to quality feeds and improve farmer access to the organized market. These goals will be achieved through activities that focus on increasing cooperative membership and growing the network of milk collection facilities throughout India.

Growth of Indian Dairy Industry

In India, Operation Flood, which commenced in 1970 introduced co-operatives into the dairy sector with the objective of increasing milk production, augmenting rural income and providing fair prices for consumers. The village milk producer's co-operative is the fundamental unit in the cooperative system. In addition to milk collection, the societies are provided with other services such as cattle feed, artificial insemination, and veterinary services. Village milk producers' co-operatives in a district are members of their district co-operative milk-producers' union.

Indian companies are preparing themselves to meet the international standards and other non-tariff barriers. Planners are taking measures to meet the sanitary and phyto-sanitary

specifications prescribed by Office International des Epizooties (OIE) under the auspices of the World Trade Organization (WTO), which range from the quality assurance of processed dairy products to the health status of livestock.

With the liberalization and open policies of the Government and the restructuring of the economy, the dairy industry is undergoing major developments. This has brought about greater participation of the private sector. The value addition and variety in the availability of milk products are on everybody's agenda. There is a consistent increasing demand for new products and processes.

Key facts about Indian dairy industry

- Ranks 1st in world milk production (140 million metric tonnes)
- Value of milk output from livestock is around ₹ 2400 billion
- Value of dairy products market is around ₹ 4000 billion
- Ice cream industry is around ₹ 25 billion
- 70% of milk is produced by marginal farmers.
- 65% of the milk is sold in 'loose' (not packaged) form
- Only 5% of the milk is sold through retail chains
- 70% of milk is delivered to the homes by 'milk agents'
- Carton milk or packaged milk has been growing at 24% annually
- Most branded FMCG companies are keen on launching flavoured dairy products whose market size is pegged at US\$ 166 million.

Major breakthrough in Indian dairy industry

Some of the major breakthroughs achieved in Indian dairy industry include the following:

- Automation in khoa production
- Design of process technology and equipment for the manufacture of peda, gulabjamun, chhana podo, long life paneer, etc.
- Development of continuous lines, including packaging, for fermented milk products like long-life lassi, Shrikhand, Dahi and Misti doi.
- Processing technology for production of Cheddar, Mozzarella and Emmental cheese as well as variety of cheese spreads
- Process of manufacture of dry mixes for gulabjamuns and frozen desserts
- User friendly milk testing kits

Status of milk products in India

The status of milk products in India is dealt under the following sub-headings.

Indigenous dairy products

An estimated 50-55% of the total milk produced in India is converted into a variety of indigenous traditional milk products using processes such as coagulation (heat and/or acid), desiccation and fermentation.

The value of khoa and chhana based sweets is estimated to be over ₹ 1,30,000 million. Khoa is used in making different kinds of traditional mithais (sweets) such as peda, burfi and gulabjamun. Some 9,00,000 tonnes of khoa valued at ₹ 45,000 million is produced in the country. Another milk product of significance is chhana brought about by acid coagulation of standardized milk. It is used to prepare chhana based sweets like sandesh, cham cham, rasogolla, etc. Approximately 1,20,000 tonnes of chhana valued at ₹ 6,000 million is produced in India. The value of khoa and chhana based sweets could exceed ₹ 1,30,000 million.

With the innovation of Scraped Surface Heat Exchanger (SSHE), the traditional sweetmeat products can be easily manufactured by the Indian dairy industry. About 15 plants in India have initiated industrial production of khoa with daily output of 1-4 tonnes using continuous khoa making machine.

India produces about 9,00,000 tonnes of ghee valued at ₹ 85,000 million.

Buttermilk is a byproduct in the production of Makkhan. It is estimated that about 55 kg of buttermilk is produced for every kg of ghee made. The value of lassi is about ₹ 25,000 million.

Cheese

The organized cheese market including its variants like processed cheese, mozzarella, cheese spreads, flavored and spiced cheese is valued at ~ ₹ 4.5 billion. Processed cheese which assumes 60% of the overall cheese market is worth ₹ 2.7 billion. The next most popular variant is cheese spread claiming a share of ~ 30% of the total processed cheese market. The market is reported to be growing at ~ 15%. The market for cheese cubes, slices and tins is growing.

Gujarat Cooperative Milk Marketing Federation (GCMMF) with the Amul brand continues to be the main operator in the branded cheese market in India. Britannia Industries joined the fray in the cheese market in mid-1990s through an arrangement with Dynamix Dairy Industries. The plant designed by Valio of Finland is run on technology tie-up with Schreiber Foods of the US. French cheese major, Fromageries Bel, a 10 billion French franc outfit, has entered the Indian market with La Vache Kirit i.e. 'The Laughing Cow'. The Bel product will be produced at Poland exclusively for the Indian market. Fromageries Bel is expected to widen its product portfolio by launching laughing Kirit (creamy cheese in cube form) and Babybel (semi-hard with a wax coating, appropriate for sandwiches).

Foreign brands in India include: Provolone, Colby, Mozzarella and Parmesan from Italy, Cheddar from Dutch, Gryueve. The US-based Philip Morris, which brought in its Kraft cheese

brand earlier, has gained a significant presence in the market. The rest of the market is spread among Verka, Nandini, Vijaya and Vadilal.

Dabur had forayed into the dairy products market through its joint venture company, Dabon International. The company claimed a product range of 20 different varieties of cheese under Le Bon brand. The demand for cheese was projected to grow to about ₹ 11.00 billion in 2014-15.

The leading brands of processed cheese in India are Amul, Vijaya, Verka, Vadilal, Kraft and Britannia.

Dairy whiteners

The market for dairy whiteners and creamers is ~ ₹ 3,000 million. Apart from MNCs like Nestle and companies like Britannia, the Indian enterprises have also made perceptible progress. Names like Amul, Sapan, Vijaya, Mohan, Parag are popular with their dairy whiteners. These are available mostly in pouches and tetrapacks.

Amul made a beginning with its whitener pouches and has emerged as a leader with a market share of 45%, followed by Nestle at 23%. Aseptically packed creamer involves techniques to impart a longer shelf life to the product. It is packed in small cups ready to be poured into a cup of tea or coffee. Creamer is fresh milk with increased fat content (up to 12%) and is aseptically packed after undergoing Ultra high temperature (UHT).

Nestle India with its 'Everyday' dairy whitener has established its brand well. It has also entered into the market with its Nestle Pure Milk and Nescafe Frappe.

While Sapan characterizes it as 'Dairy special' (instant milk mix for tea and coffee), Vijaya is the only UHT processed milk homogenized brand sold in the market in 200 ml and 1 lit. tetrapak. All the rest, Amulya, Meadow, Mohan, Parag and Shweta dairy whiteners are in the form of powders. Mohan also markets a non-dairy whitener alongside its dairy type product.

The leading players for dairy whiteners/creamers include Nestle, Amul, Britannia, Dynamix Dairy, Sterling Agro, Haryana Milk Foods, Mohan Food, Modern Dairy, K Dairy; whereas the leading brands include Amul, Sapan, Vijaya Spray, Meadow, Mohan, Parag, Shweta, Malkana, Gagan, White Magic, Every Day.

Major players in dairy products

SmithKline Beecham Consumer Healthcare, Nestle India and Heinz India are amongst the large MNCs that dominate the high-value milk products market. Other players include Indiana Dairy Specialties, Jagatjit Industries Ltd. and various other state co-operatives.

Some dairy plants are involved in the production of *mithais* on a commercial scale. Some national brands like Haldiram, Bikanerwala, KC Das, Chitales, Ganguram, Brijwasi, Agarwal Sweets, etc. are getting wide acceptance.

Export of dairy products

From 2000 onwards, milk powder, casein, whey products and ghee from India have started making their presence felt in the global markets. Indigenous milk products and desserts are becoming popular with the ethnic population spread all over the world. Therefore, the export demand for these has gone up tremendously. Presently, ghee is being exported to Nepal, Bhutan, Bangladesh, Middle East countries and a modest quantity to North America, New Zealand and South Africa to serve the ethnic market.

The World Trade Organization (WTO) regime is now a reality as India is a signatory under the WTO rules has opportunity to extend its exports product base. It has become more open world trade regime, where barriers to trade have been reduced. The major dairy products exported from the country includes skimmed milk powder, whole milk powder, ghee, butter oil, milk food for babies, butter, milk for babies, milk and cream etc.

Export of dairy products has been growing at the rate of 25% per annum in terms of quantity terms and 28% in terms of value since 2001. In 2014-15, India exported 66,424 million tonnes of dairy products worth ₹ 1,205.4 crores (APEDA). The countries to which our Indian dairy products are exported include Bangladesh, Arab Republic, United Arab Emirates, Pakistan, Nepal and Bhutan. Significant investment opportunities exist for the manufacture of value-added milk products like milk powder, packaged milk, butter, ghee, cheese and read-to-drink milk products.

Safety issues

In order to address food safety issues in the dairy sector, the Central government has enacted a scheme called 'Strengthening Infrastructure for Quality and Clean Milk Production', which is aimed at improving milk quality at the village level. The scheme involves monitoring data collected from milk collection centers, which is further analyzed by Food Safety and Standards Authority of India (FSSAI) officials involved in creating food safety policy.

Projected dairy industry scenario

According to Associated Chambers of Commerce and Industry (ASSOCHAM), the value of the Indian dairy industry was expected to touch ₹ 5 lakh crore by 2015, with milk output pegged at 190-200 million tonnes at the end of the period; the Indian dairy industry is growing at the rate of 10.0% per annum.

Future scope of Indian Dairy Industry

Despite being the largest milk producer in the world, there is ample scope in improving the productivity of milch animals. This can be done through progeny testing, feeding nutritive feed to milch animals, looking after animal's health, crossbreeding and so on. Only 30% of the total milk produced in the country is being processed by the organized dairy industry; ample scope exists in increasing this level at least to 50% level in about 10 years period. The microbial quality of milk is far from satisfactory; awareness is to be created amongst milk producers for 'Clean milk production'. Sale of 'loose milk' should be restricted, specifically through legislation. Malpractices in dairy industry such as adulteration of milk and milk products, preparation of 'synthetic milk' needs to be curbed completely. Improved packaging of the Indigenous dairy based sweetmeats is the need of the hour. Mechanization in the manufacture of indigenous milk sweets is yet to be perfected, taking into account hygiene, energy required and environmental safety issues. There is a need to make milk free from antibiotics, hormones and pesticides. Production of organic milk should be encouraged.

Rabobank expects value-added dairy products such as yoghurt, paneer, cheese, ice cream and baby food to grow at compound annual growth rate (CAGR) of 20-30% in the next 4-5 years.

Of the top 20 dairy companies in the world, six have already set foot in India in some way or the other. Danone Food and Beverages (India) has set up production base in India. New Zealand's Fonterra is exploring possibility of tying up with local partners. The growth of food and coffee chains such as Café Coffee Day, Pizza Hut, Dominos, Mc Donalds are expected to help increase the consumption of value-added dairy products.

There is enormous scope seen ahead before the dairy industry for value-added products including custards, desserts, puddings, sauces, mousse, stirred yogurt and nectars. Demand for processed and packaged dairy produce in urban centers is going to see a phenomenal growth due to growing population with higher disposable income and greater health consciousness.

Private sector can play a pivotal role in reducing the cost of production by employing advanced techniques to enhance productivity, provide breeding facilities for cattle and improving the health of the dairy animals apart from developing proper dairy production, processing and marketing infrastructure.