

Milk and Milk Products in Bangladesh

Parvin SHAHNAZ¹, Kei-ichi SHIMAZAKI² and Isao KATO¹

(June 2004)

Background

The People's Republic of Bangladesh is a long-lying reverie country with a total area of 143,998 square kilometers. About 130 million people live within this area that makes it the world's number one country in terms of population.

Generally, Bangladeshis are very fond of dairy based sweetmeat. In Bangladesh, it is a very common and prestigious feature to serve and consume dairy products as dessert in all festivals and occasions. Though the milk production of Bangladesh is very low and a large part of the population cannot afford milk. But a huge number of dairy based sweet shops are located in every corner of the country. Various types of delicious traditional dairy products are available in the country. But the information and research on these products is scanty and no attempt has been taken yet.

The main objective of this study is to introduce milk and milk products of Bangladesh.

Livestock Population in Bangladesh

Bangladesh is the agro-based country with agriculture; livestock and fisheries are the most important professions for the rural people. Tra-

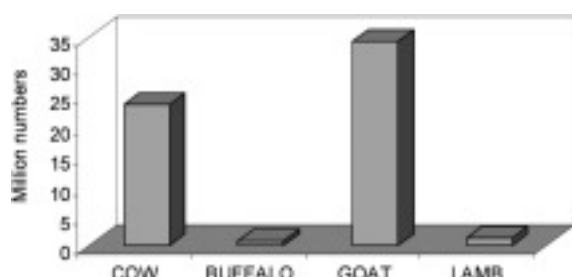


Fig. 1 Livestock population of Bangladesh in 2001- 02

ditionally, most of the farmer families in Bangladesh with other agro activities possess cows for draft purposes as well as for producing milk for their own consumption. Statistical survey interpret that there are about 23.72 million cows, 0.86 million buffaloes, 34.19 million goats and 1.24 million lambs in Bangladesh (Figure 1) (2).

Milk Production in Bangladesh

The proportion of milking cows is 45% with average milk production 200-300 liters per lactation period comprising 180-240 days a year, except in certain milk pocket areas where exist some local, crossed and comparatively high breed cattle having milk production of 800-1000 liters in 210-300 days of lactation. The present milk production of the country as shown in Figure 2 is estimated to 1.76 million metric tons of which 73% is from cows and the balance 27% is received from buffaloes and goats. This production rate is very low in compare with the number of dairy cows (2, 4).

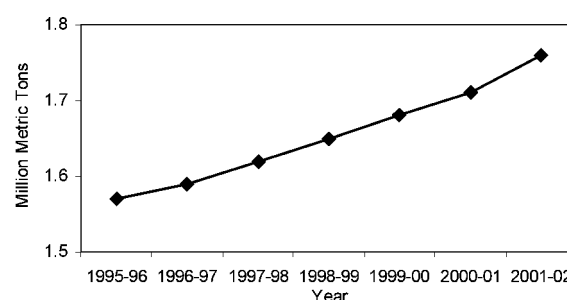


Fig. 2 Trend of milk production from 1995 to 2002 in Bangladesh

Import of Powder Milk

The quantity of milk produced in the country

¹ Graduate School of Dairy Science, Rakuno Gakuen University, Ebetsu, Hokkaido, 069-8501 Japan

² Dairy Science Laboratory, Faculty of Agriculture, Hokkaido University, Sapporo, Hokkaido 060-8589 Japan

does not meet-up the existing demand of the country. To cater the national deficit the Government is to import powder milk from developed countries. Averagely 0.16 million metric tons of liquid milk which is equivalent to 9-10% of the total milk consumption of the country is received from this imported powder milk. The data from Bangladesh Milk Producers Cooperative Union Limited (2002) indicates that the price of powder milk (US\$0.31/liter), assumed that 1 kg of powder milk equivalent to 8 liter of liquid milk, is comparatively cheaper than local liquid milk (US\$0.41/liter). Figure 3 shows the trend of powder milk import in the country.

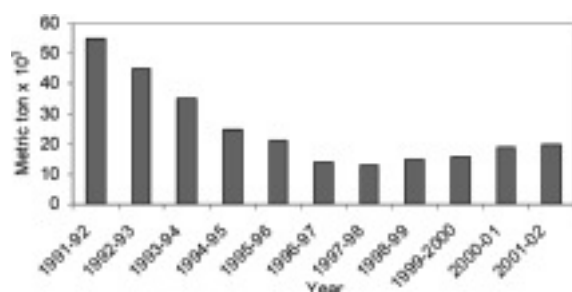


Fig. 3 The amount of powder milk imported to Bangladesh from other country

The imported powder milk is used by local business houses to pack and market in small units of tin container, polyethylene pouch and paper boxes using different brand names. A number of brands are available in Bangladesh market such as Red Cow, Anchor, Budget, Danish, Dano, Diploma, Energy, Fresh, MilkVita, Nido, Star Ship, Quality. Among these powder milk brands Dano is the market leader catering about 15% alone. On the other hand, Nido is the high priced due to its international brand and is directly imported in packing condition. The only brand, Milk Vita, is manufactured in the country from quality fresh milk (2, 4).

Milk Consumption

The estimated milk consumption in the country is 1.92 million metric tons of which 1.76 million comes from the domestic production and the rest 0.16 million metric tons from the imported powder milk. Per capita need was assumed to be

240g of milk/day but availability is only 42g/day. It is important to be careful when using the term 'demand' for milk because total requirement does not represent the market demand for milk. Ahmed (2000) suggested that for the development of demand, the market segment must have the willingness and economic ability to buy the product. In this sense, the demand for milk will be lower than the estimated amount (10.5 million tons) as the majority of people do not have adequate buying ability. Nevertheless, the gap between availability and demand is very pronounced. Total milk consumption, demand and deficit are shown in Figure 4 (2, 7).

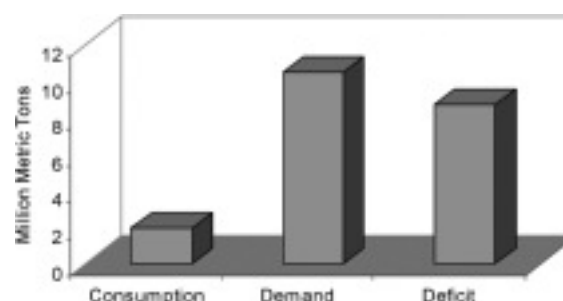


Fig. 4 Difference of Consumption, Demand and Deficit of milk in Bangladesh

Non-Traditional Dairy Products

Non-traditional dairy products such as processed liquid milk, butter, ice cream, flavoured milk, full cream milk powder, skimmed milk powder, condensed milk have gained popularity in the Bangladesh market only during the last few years as shown in Figure 5. For an example, nearly two decades back there were 2 milk-processing plants in the country with limited processing capacity against a number of about 10 in present days. However, consumption has been expanding with increasing urbanization (2, 4).

The scenario of non-traditional dairy products production in the country is given below:

Processed Liquid Milk

The total quantity of milk, consumed in Bangladesh, is received by the consumers directly from the indigenous sources and it is about 95%. Rest 5% is from processed sources. One of the main

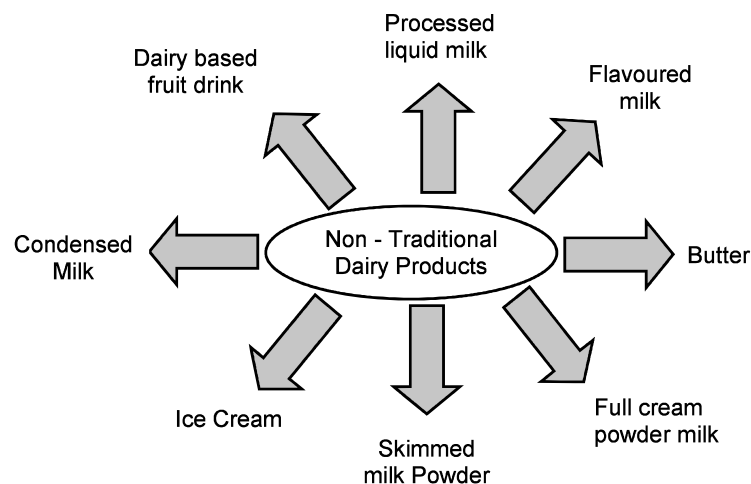


Fig. 5 Chart of Non-traditional dairy products of Bangladesh

reasons is that processed milk marketing sector is not widely expanded throughout the country. Besides, several consumers in urban areas still prefer to buy loose milk from vendors due to the strong perception that loose milk is fresh. Report from Bangladesh Milk Producers Cooperative Union Limited (2002) revealed that all the processed liquid milk manufacturing companies are selling 185,000 liters of processed liquid milk per day (2, 4).

Condensed Milk

Condensed milk is very popular in Bangladesh. Generally, most of the people in Bangladesh drink tea with milk. For the convenience people like to use condensed milk for tea making. In the market 4 brands are available. These are Danish, Star Ship, Goalini and Dutch Fresh. According to the capacity of their plant they can produce 520-ton condensed milk per day. The condensed milk manufacturing companies are using imported powder milk (2, 4).

Traditional Dairy Products

Different types of nutritious and delicious traditional dairy products are available in Bangladesh. The market for indigenous milk based food products is difficult to estimate as most of these products are manufactured at home or in small cottage industries catering to local areas. Consumers while purchasing dairy products look for freshness, quality, taste and texture, variety and

convenience. Keeping quality of traditional dairy products except *Ghee* are very low. These products are therefore manufactured and sold by local milk and sweet shops. There are several such small shops within the vicinity of residential areas. Consumer loyalty is built by consistent quality, taste and freshness. Now a day, Bangladesh Milk Producers Cooperative Union Limited is manufacturing some traditional dairy products such as *Dahi*, *Ghee* and *Rasomalai*. Some of the products are available all over the country and some of them are confined in special area. Specific area is famous for manufacturing specific type of traditional dairy product. Not only that few families are involved with the production of certain types of product. They have been keeping the protocol secret years after years (2). A chart of traditional dairy products of Bangladesh has been shown in Figure 6.

A comparison between traditional dairy products of Bangladesh and their western counterparts has been shown in Table 1.

The manufacturing procedure of some common and popular traditional dairy products is described below:

Concentrated Products

Kheer

Kheer is one kind of sweetened dessert of thick consistency. The product is prepared for immediate consumption. Generally *Kheer* is prepared in the house by concentrating whole milk in open

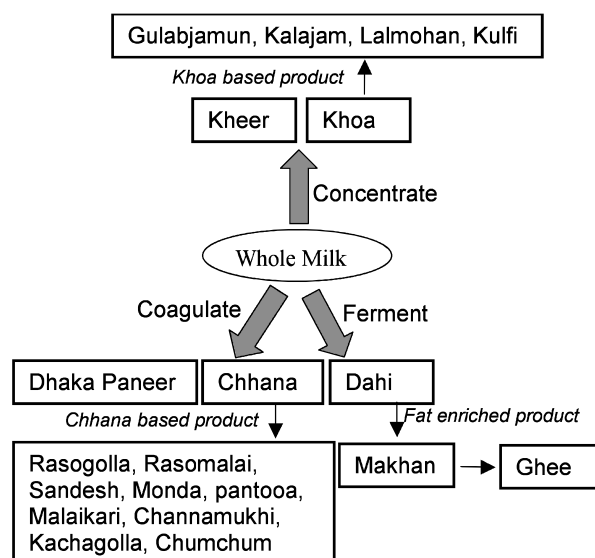


Fig. 6 Chart of traditional dairy products of Bangladesh

Table 1 Traditional dairy products of Bangladesh and their Western counterparts

Traditional dairy products	Corresponding western products	Principle of manufacture	Method of utilization
<i>Chhana</i> based products	Lactic coagulated green cheese	Acid coagulation and draining	As a base for traditional sweets
<i>Dhaka Paneer</i>	Soft cheese	Rennet coagulation, draining and salting	For direct consumption
<i>Kheer</i>	Condensed milk	Partial dehydration in open pan with sugar, and occasionally rice, etc.	For direct consumption
<i>Khoa</i> based products	Evaporated milk	Open-pan dehydration to a semi solid consistency	As a base for traditional sweets
<i>Kulfi</i>	Ice cream	Concentrated milk, sugared and frozen	For direct consumption
<i>Dahi</i>	Curd/yougurt	Fermentation	For direct consumption
<i>Makhan</i>	Butter	Churning of fermented whole milk	For table use or clarified into ghee
<i>Ghee</i>	Butter oil	Clarification of butter or cream	For table use or as a frying medium

Source: *Outlines of Dairy Technology* by Skumar De (1980).

pan over a direct fire together with sugar, rice, cashew nuts, cardamon and other spices. One kind of *Kheer*, called *Patar Kheer* is commercially available in one region of Bangladesh (1, 6).

Khoa/Mawa

Khoa/Mawa refers to the partially dehydrated whole milk product prepared by the continuous heating of milk in an indigenous pan over a direct

fire, while also constantly stirring-cum-scraping till it reaches a semi-solid consistency. For the production of *Khoa/Mawa* five times concentration of milk is normally required. It is used as a base material for a variety of traditional sweets (6). A brief outline of *Khoa*-based sweets is given in Table 2.

Frozen Products

Kulfi

This indigenous ice cream is based on milk and is popular in the hot summer. It is frozen in small containers. The preparation of *Kulfi* involves concentration of a milk and sugar mixture to 50 per cent volume. It is cooled before addition of cooled cream, crushed nuts and selected flavourings. The milk is added to moulds and frozen in a vessel containing an ice and salt mixture with a 1:1 ratio (1, 6).

Coagulated Products

Chhana

Chhana refers to the milk-solids obtained by the acid coagulation of boiled hot whole milk and subsequent drainage of whey. The acids commonly used are lactic or citric, in both natural and chemical forms. *Chhana* use as a base and filler for the preparation of a large number of traditional milk sweets such as *Rasogolla*, *Rasomalai*, *Sandesh*, *Monda*, *Pantooa*, *Malaikari*, *Channamukhi*, *Kachagolla*, *Chamcham*, etc. (6). Table 3 gives an outline of preparation of some *Chhana* based sweets.

Dhaka Paneer

In Bengali language, cheese known as *Paneer*. *Dhaka Paneer* is one of the most famous and

popular dairy products in Bangladesh. The village, named *Astogram* is the source of this product. That is why, it is also known as *Astogram Paneer*. Some families have been manufacturing this cheese for 100 year and keeping the protocol secret. *Dhaka Paneer* can be classified as semi hard or hard cheese. *Dhaka Paneer* can be prepared from cow milk, buffalo milk or goat milk. Fresh raw milk is boiled and cooled down to the body temperature. Whey, obtained from previously prepared *Paneer*, is added to the milk. Indigenous rennet, made from abomasum of cattle by the *Paneer* maker, is added. Milk is coagulated within 30-40 minutes. Hard coagulum is broken by hand or knife. Whey is drained out. Hooping the *Paneer* in a special type of bamboo made basket. The basket is kept in a cool place for one day in order to drain out the whey. At the center of the *Paneer* 2 or 3 hole of 1.25cm diameter is made in which salt is poured. This salt increases the keeping quality. *Dhaka Paneer* is sold and utilized within one month of preparation (5).

Fermented Products

Dahi

Dahi is a well known fermented milk product consumed by large sections of the population of the country, either as a part of daily diet or as a refreshing beverage. The corresponding western

Table 2 Khoa based products

Name of <i>Khoa</i> / <i>Mawa</i> based sweets	Outline of preparation
<i>Peda</i>	In an indigenous pan <i>Khoa</i> and sugar is mixed and warmed by gentle fire until firm balls are formed. The pan is removed from the fire; nuts and flavoring materials are added, if desired. The contents are then mixed thoroughly and made into balls of desired size (1, 6).
<i>Gulabjam</i>	<i>Khoa</i> is mixed with wheat flour and baking powder and kneaded into uniform dough. The dough is rolled into small balls and deep-fried in <i>Ghee</i> or <i>Dalda</i> (vegetable <i>Ghee</i>) in a shallow pan until the balls acquire a golden brown color. Sugar is dissolved into water and boiled to make sugar syrup. Fried balls are then placed into the sugar solution and allowed to soak for a few hours before being served (1, 6).
<i>Kalajam</i>	<i>Khoa</i> (or <i>Chhana</i>) is mixed with a small amount of wheat flour and baking powder and kneaded into smooth dough. The mixture is then portioned and rolled into balls and deep-fried in <i>Ghee</i> or <i>Dalda</i> (vegetable <i>Ghee</i>) until the surface is charred to almost a black color. The balls are then soaked in sugar syrup (dissolve sugar into water and boil) for a few hours to allow the sugar syrup to penetrate inside the <i>Kalajam</i> . It is then removed from the sugar syrup and stored or consumed (1, 6).

Table 3 Preparation of Chhana based Sweets

<i>Chhana</i> based products	Outline of Preparation
<i>Rasogolla</i>	<i>Chhana</i> is broken into bits and kneaded. A small quantity of flour might be added to avoid cracks in the finished <i>Rasogollas</i> . Made the <i>Chhana</i> balls by hand. Sugar is dissolved into water and boiled the solution in order to make sugar syrup. The <i>Chhana</i> balls are then gently put in the boiling sugar syrup and cooked until the balls are swollen and slightly darken color. During cooking cold water is sprinkled at regular interval. Cooled down the finished product before being served (1, 6).
<i>Sandesh</i>	<i>Chhana</i> and sugar are mixed and then kneaded and finally heated. The heated mass is either removed directly into moulds or poured into a tray and cooled and set leave it to cool and set. It can then be cut into desired shapes or moulded into required forms. A high priced and delicate type of <i>Sandesh</i> , known as <i>Gurer Sandesh</i> , is prepared from date jaggery (date gur) (1, 6).
<i>Chamcham</i>	<i>Chhana</i> is mixed with a small amount of semolina and then made in to small balls. The balls are fried lightly in butter oil or <i>Ghee</i> . Sugar syrup is made by mixing sugar with water and boiling. The balls are then cooked in the boiling sugar syrup until the desirable firm body and close texture are formed. Finally the balls are removed from the syrup and coated with sugar or <i>Khoa</i> . (1, 3, 6)
<i>Lalmohan</i>	<i>Chhana</i> is mixed with wheat flour and kneaded into uniform dough. The dough is rolled into small balls and deep-fried in <i>Ghee</i> until light brown in color. The balls are then transferred to sugar syrup and allowed to soak for a few hours before being served (1, 3, 6).
<i>Pantooa</i>	<i>Chhana</i> is mixed with wheat flour and baking powder and kneaded into uniform dough. The dough is portioned and rolled into balls by hand. The balls are fried in a shallow pan using <i>Ghee</i> till the balls are deep brown in color. The balls are removed from the pan and placed in sugar syrup and soaked for a few hours before being served (1, 6).
<i>Rasomalai</i>	<i>Chhana</i> with a small amount of wheat flour is kneaded into smooth dough, portioned and rolled into balls having a smooth texture free from cracks. The balls are processed like <i>Rasogolla</i> and subsequently stored in thickened milk (to a quarter of its volume by heating) with added sugar (1, 6).
<i>Jilapi</i>	<i>Chhana</i> is mixed with a small amount of semolina. The mixture is then fallen into boiling syrup in the shape of rods over-lapping each other (1, 3, 6).

counterpart of *Dahi* is curd/yogurt. *Dahi* may be classified into Sweetened (*Misti Dahi*), sour *Dahi* and mildly sweet or sour *Dahi*. *Dahi* is also used as an intermediary step in the manufacture of indigenous butter (known as *Makkhan*) and *Ghee*. *Dahi* can be prepared by using traditional method or standardized method. Traditional method is used on a small-scale production, either in the consumer's household or in the sweet-maker's shop in urban areas. In traditional method, the milk is boiled, cooled to body temperature, inoculated with 0.5-1 percent starter (previous day's *Dahi* or butter milk) and then allowed to set undisturbed overnight (6).

Makkhan

Makkhan refers to the country/deshi butter normally obtained by churning milk curd (*Dahi*) with crude indigenous devices (6).

Ghee

Ghee may be defined as clarified butterfat prepared chiefly from cow or buffalo milk. *Ghee* may be prepared either from butter or cream. Butter may be either deshi or creamery. Flow diagram of *Ghee* making is given in Figure 7 (6).

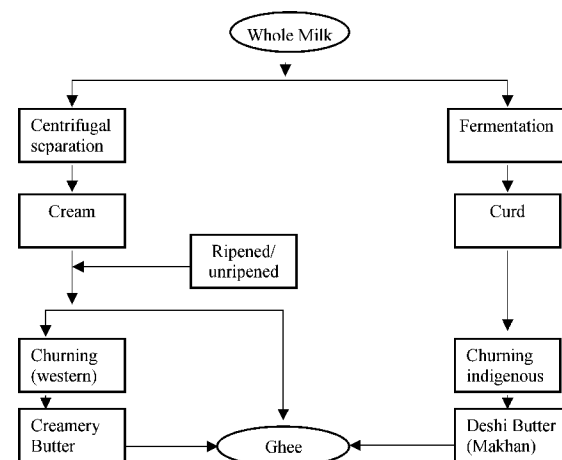


Fig. 7 Schematic diagram of ghee preparation
Source: *Outlines of Dairy Technology* by Skumar De (1980).

Conclusion

Milk and milk products is an integral part of Bangladesh food. The country is a good market for traditional and non-traditional dairy products. The information on milk and milk products are very limited. Attempt should be taken to make standardized method of preparation for traditional dairy products. Functionality of indigenous dairy products should be investigated.

References

1. Food and Agriculture Organization of the United Nations. 1990. The technology of traditional milk products in developing countries, FAO Animal Production and Health Paper 85.
2. Haque S.A.M. Anwarul. 2003. Paper on Dairy Development in Bangladesh, Inception Workshop on National Demonstrations on the Lactoperoxidase System, Savar, Bangladesh.
3. Itzerott, G. 1960. Notes on Milk and Indigenous Dairy Products in Pakistan. *J. Dairy Sci.* 22-7: 325.
4. Mandal Nasim Ali. 2002. Paper on Milk Vita - The National Cooperative venture for Economic Development, National Symposium on Challenges before the Animal Husbandry Sector in the Present Economic Scenario, Kolkata, India.
5. Md. Abdul Hamid Miah. 1986. Dugdha Biggan (Milk Science, in Bengali). Pattha Pustak Bivag, Bangla Accademy, Dhaka.
6. Sukumar, De. 1980. Outlines of Dairy Technology. Oxford University Press, New Delhi.
7. Sadullah, M. 2001. Paper on Smallholder Dairy Production and Marketing in Bangladesh, Workshop on Smallholder dairy production and marketing-opportunities and constraints, India.

要 約

バングラデシュは14万平方キロメートル(北海道の約1.7倍)の国土を有し、人口が約1億3千万の国である。インドの東側に位置し、熱帯気候の農業国である。農業は主に稲作であるが、畜産も盛んである。其中で酪農部門として飼養している家畜と

しては23百万頭の牛、86万頭の水牛、34百万頭の山羊そして120万頭の羊が飼われている畜産大国である。乳生産量は年間200万トンであるが、其のうち、170万トンは牛乳であり、残りの30万トンは水牛と山羊乳である。

バングラデシュの牛乳及び乳製品の消費は年間192万トン前後であるが、其のうち176万トンは国内生産であり、残りの約19万トンは外国からの輸入に頼っている。しかし国内の需要は更に1千万トン以上があるが、国民の収入不足と国内の流通ルートの不備から国がそれらの問題を解決できずに今日に至っている

バングラデシュではこの数年、飲用乳やバター、アイスクリームの消費が増大し、しかも近年新しい2つの乳製品工場ができたことによって大いに一般市民への利用が高まってきている。しかし、飲用乳だけで見ると、其のうちの95%は直接生産者から消費者へ渡されており、のこりの5%のみが工場からの供給である。これは、まだまだ、製品の供給ルートが都市のみに偏っていることを示している。現在でも一般の人々はお茶に練乳を加えて飲用することが普通であり、現在4社(Danish, Star Ship, Goalini, Dutch Fresh)が練乳生産を行っている。

バングラデシュ固有の乳製品としては、大きく分けて全乳を濃縮させて利用するケール(Kheer)とコア(Khoa)、酸凝固させるダッカ・ポニル(Dhaka Paneer)とチャハナ(Chhana)、更に発酵させるダヒ(Dahi)がある。ケールは普通の家庭で作られるお菓子のようなもので、全乳を濃縮させながら砂糖、お米、ナッツ等を加えた甘い乳製品で一種の乳菓子であり、パタルケール(Patar Kheer)とも呼ばれている。コアは全乳をほぼ半固体状になるまで濃縮し、それをベースにして共和国固有の多くの乳製品(Gulabjamun, Kalajam, Lalmohan, Kulfi)を製造している。ダッカ・ポニルはベンガル語でチーズを意味し、全乳を酸凝固発酵させて製造するチーズである。バングラデシュで最も庶民的な乳製品であり、しかもこの100年来各家庭特有な製造法を伝統として引き継がれてきている。

チャハナは全乳を酸凝固させて得られたカードのことを言い、それをベースにして多くの甘い乳製品(Rasogolla, Rasomalai, Sandesh, Monda, Pantooa, Malaikari, Channamukhi, Kachagolla, Chumchum)を製造している。

ダヒは乳製品中でも大きな消費を占めているもので、ヨーグルトの一種であり、甘いもの、酸味の強いもの等の多くの製品がある。その他、マクハン

(*Makhan*) とギー (*Ghee*) がある。マクハンは全乳を発酵させた後に脂肪分を分離して得られたバターであり、ギーはそのバターを半溶解した一種のバターオイルで乳飲料として利用している。

以上バングラデシュの乳製品を簡単に説明したが、今後更に乳製品の需要が向上することから、西欧的な製造法の導入と固有な乳製品の製造法の確立が急務とされている。