Development of Dairy Cooperative and Its Impacts on Milk Production and Household Income: A Study on Bangladesh Milk Producers' Cooperative Union Limited

Ashoke Kumar GHOSH
Associate Program Officer, Research Initiatives, Bangladesh (RIB), Dhaka, Bangladesh.
E- Mail: ashoke1971@yahoo.com

Keshav Lall MAHARJAN
Associate Professor, Graduate School for International Development and Cooperation.
Hiroshima University, 1-5-1, Kagamiyama, Higashi- Hiroshima, 739 -8529, Japan.
E- Mail: mkeshav@hiroshima-u.ac.jp

Abstract

Bangladesh Milk Producers' Cooperative Union Limited (BMPCUL) has emerged as a pioneering cooperative organization in the country. Through its dairy development activities for the last three decades BMPCUL has made a significant impact on the milk production and household income for the dairy cooperative members. Considering this fact, this paper explores the chronological development of BMPCUL; extension of its areas and activities towards dairy development in Bangladesh and analyses some aspects of its performance in milk production and household income.

1. Introduction

Milk production is an important source of income for the rural poor, unfortunately the condition of dairy sector in Bangladesh is not healthy. Most of the people in rural areas are poor and landless, and the raising of cows is done in a traditional way without any especial care. Majority of the rural households keep cattle in order to cultivate their land and also produce milk for family consumption. Dairy cows in Bangladesh are mainly *Bos Indicus (Zebu)*, which generally are small in size and slow growers (Alam, 1995). They are light in weight and produce comparatively less milk. They are usually fed with residues of crops instead of the supplementary feed and fodder. Although, there is a general trend to maintain cows in Bangladesh, the rural people have not yet undertaken dairy industry on a commercial scale and as a means of income generation. Under this situation, policy could be made to upgrade the dairy cow breeds by the artificial insemination and supply the necessary inputs to the rural areas where most of the cows are found in Bangladesh. Although the Government extension department could have played an important role by providing available facilities and services, such as, artificial insemination, supplementary feed, medication, and fair pricing system to the poor milk producers, no provision has been done so

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far. Because the Government has livestock development office in District/Thana level (administrative units) and most of the offices are located in urban area. It is not easy to access these services for the rural poor. On the other hand, lack of veterinarians, medicine, and other facilities has made the system inefficient. The poor milk producers suffer from lack of capital and also they do not have any financial support. These unorganised milk producers are also unable to get the proper price for their product due to the seasonal and regional variations of the market price. To reverse the situation, the Government of the People' Republic of Bangladesh, undertook a development scheme entitled Cooperative Dairy Complex (presently BMPCUL) based on the recommendations from the various international development organizations; such as United Nation Development Program (UNDP), Food and Agricultural Organization (FAO), according to the pattern of Anand Milk Union Limited (AMUL), in India.[1] The scheme had the proposal of establishing dairy plants in some milk surplus area of the country viz. Tangail, Manikganj, Tekerhat and Baghabarighat, with a city dairy plant at Dhaka. The main objective of forming this cooperative dairy project was to raise income of the poor milk producers living in rural areas, provide them with available dairy services and ensure reasonable price through a guaranteed milk market.

BMPCUL has been functioning since 1973 with the aims of making a dairy base in Bangladesh, as well as working for rural income growth, by providing dairy inputs to cooperative members at low cost and ensuring fair milk prices to the small rural milk producers. Presently they are carrying out dairy cows keeping on a cooperative basis and are producing a large amount of milk. They have set up their own milk processing centres, own veterinary services, milk marketing channels and established their own transportation system with the assistance of the Government. The Government loan was given to the BMPCUL for establishing the dairy infrastructure, such as, transportation system, processing centres, factory, and available extension and marketing facilities. The BMPCUL has been conducting cattle development programs comprising of the supply of improved semen, mobile veterinary services, and feed and fodder and also providing marketing facilities to dairy cattle holders. In this way BMPCUL has been contributing towards dairy development in Bangladesh since last three decades. But there are very few research works being done on the cooperative dairying in Bangladesh. Most of these researches concentrated on milk marketing channels and management affairs of BMPCUL and its extension activities in very few milk shed areas. Ghosh and Maharjan (2001) have showed the milk vita extension services and cooperative development activities in Baghabarighat milk shed area. Authors have found the milk vita extension services; Artificial Insemination (AI), numbers of cooperatives, number of cooperative members, number of milk cows and milk production have increased within the last 30 years in Baghabarighat area. Asharafuzzaman (1995) found that cooperative dairy members are enjoying an ensured milk market for selling their milk and earning better price compared to other milk marketing channels in Bangladesh. Rahaman and Mian (1996), also found same trend that cooperative members can receive better milk price under cooperative system. Roy (2000), conducting a research on milk marketing under cooperative management again, has shown that cooperative members are receiving higher milk price compared to non-cooperative milk producers.

However, these studies could not depict the whole development activities and dairy extension services of BMPCUL. None of these researches highlights the chronological development of cooperatives activities over time. Moreover, nor these studies showed the impacts of cooperative dairying on milk production and income growth over time. Hence, present study is an endeavour to analyse the dairy development activities of BMPCUL over period and show the overall impacts of BMPCUL on milk production

and household income of the cooperative members in Bangladesh. Keeping the objectives in mind field study was conducted on BMPCUL in order to fulfil those objectives for positive analysis.

1.2. Field Study

Considering the main objectives, field study was conducted on milk shed areas of BMPCUL. The data was collected in two phases. Firstly Chronological data of last 30 years of BMPCUL was collected from secondary sources in November 2002 to February 2003, which includes extension of cooperative services, milk collection, milk price paid to the farmers, and loss and profit of BMPCUL. Considering the overall impacts of BMPCUL, chronological data of last fifteen years was also collected regarding milk production and milk price paid to the farmers.

Secondly, primary data was collected through field survey in June to September of 2000. The household level data was collected regarding the nature of dairy cows, milk production, milk prices and income of the milk producers. In doing so, two villages with the dairy cooperative namely, Potajia in Sirajganj district and Vennabari in Gopalganj district under BMPCUL and two traditional (non-cooperative) villages namely Labutalla village in Jessore district and Nohata village in Chandpur district were taken for the present study. From each of these sample villages, 40% of the households were randomly sampled. The sample together comprised of 130 households from the cooperative villages (60 households from Potajia and 70 households from Vennabari) and 84 households from other sample villages (70 households from Labutalla and 14 households from Nohata).

Moreover, to understand the dairy activities and services in milk shed areas and its relation to the primary cooperatives one milk shed area named Baghabarighat and a primary milk producers' cooperative under the same milk shed area were taken as the respective samples for the present study. Various people from different sectors; professionals, officers, cooperative members, cooperative managing committee and general workers were interviewed. Furthermore, participatory observation was undertaken by the authors to understand the nature of dairy development activities being performed in primary milk producing cooperative as well as in milk shed areas. For all these tasks, detailed interviews were conducted to the respective groups of people through the use of structured questionnaire developed by the authors.

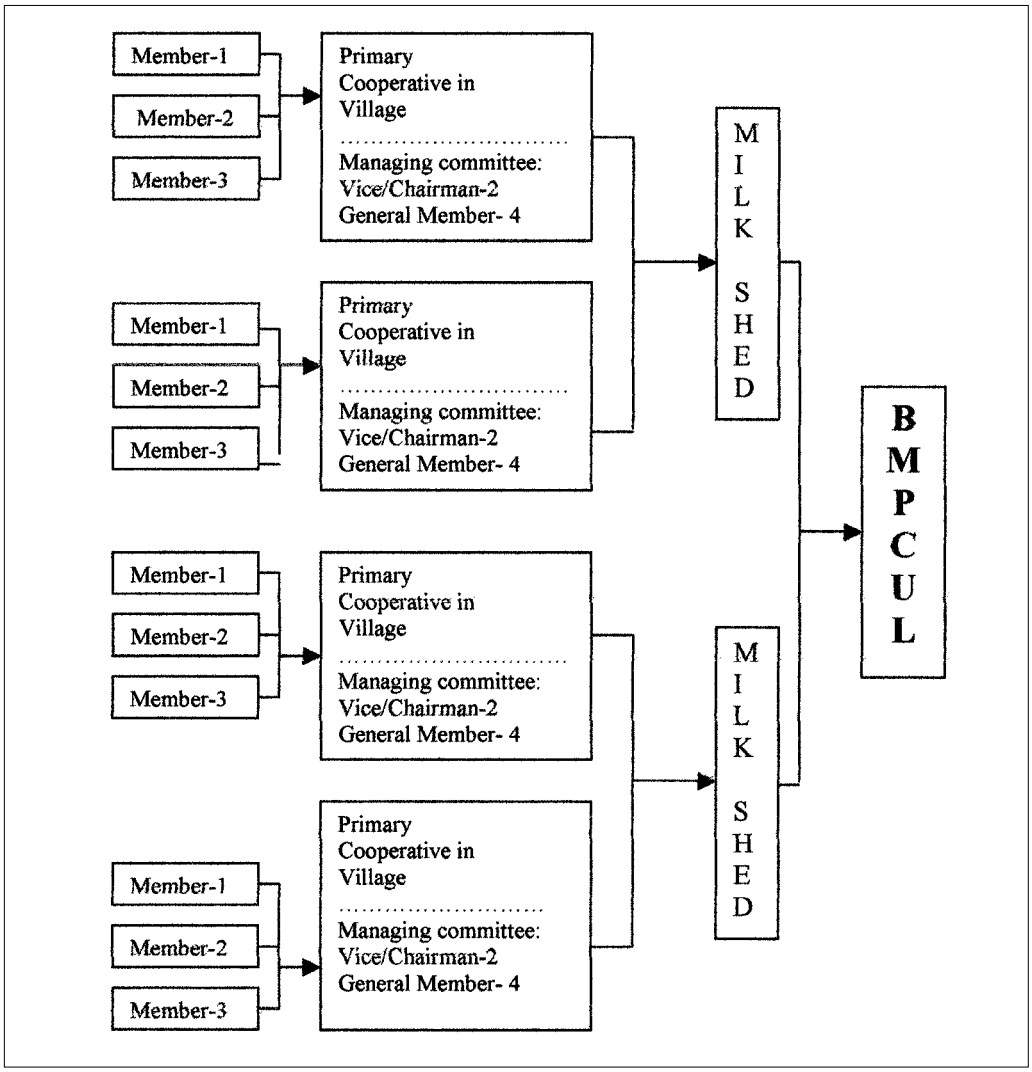
This paper is divided into four sections. First section provides the research background and methodology, second section provides the management affairs and dairy development activities of BMPCUL over time and subsequent section examines the impacts of dairy cooperatives on milk production and household income of the milk producers. In doing so, a comparison was made between the cooperative members and non-cooperative milk producers in the sample surveyed villages. The special attention was given regarding the dairy breeds, milk production and income earned from dairy cows keeping. Finally main conclusion was outlined on the basis of presented data.

2. Bangladesh Milk Producers' Cooperative Union Limited

2.1. Management Affairs

Bangladesh Milk Producers Cooperative Union Limited (BMPCUL) was for a long time operated under a civil service administration system governed with cooperative principles, rules and by-laws rather than on commercial concepts and practices. But some major changes in the overall policy of BMPCUL have already been experienced in recent years. Major administrative reforms were made in 1991 by appointing a professional chief executive in place of government deputation and adopting

appropriate policies and measures. A managing committee of BMPCUL, consisting of nine members, six of which including the chairman and vice-chairman is directly elected by the milk producers' primary societies and the rest of three are nominated from the government. This body handles the action plans and policy issues of the organization in their meeting with the assistance of executive line. The executive head of the organization is the general manager who adheres to the responsibility of implementing the decisions of the managing committee with other routine job through the professionals and workforces. The professional level includes personal from different discipline like mechanical engineering, electrical engineering, animal husbandry, veterinary science, biochemistry, accounting marketing, and finance.



Source: Field Survey, 2002-03.

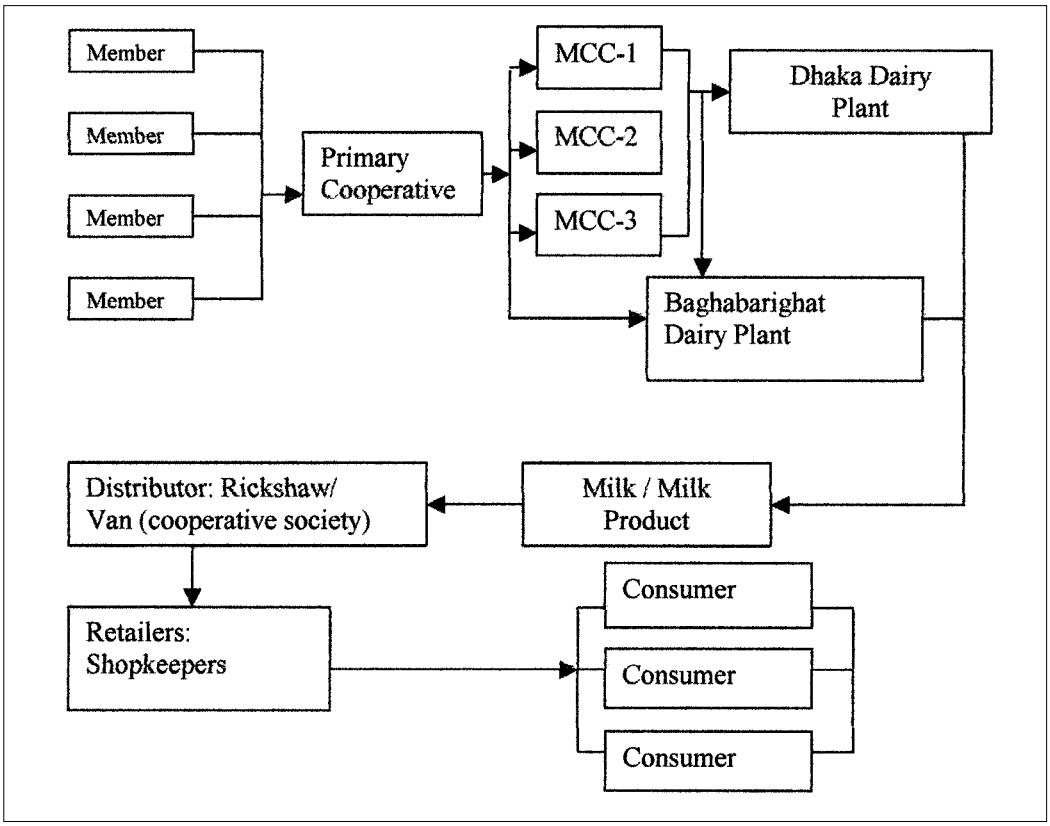
Figure 1: Organizational Structure of the Primary Cooperative and its Connection to BMPCUL

The primary dairy cooperatives (at village level) are the grass-root level organizations. A primary milk producers' cooperative consists of one to three villages covering an area of approximately 1-2 sq. miles, having a marketing surplus of 180-200 litres of milk per day. The village level cooperatives have their own managing committee.

All these members elect their chairman through using their voting right. The primary cooperative has their milk collection centre where they collect milk twice a day (morning and evening) and send them to the processing centre. A numbers of cooperatives together constitute a milk-shed area that has milk-processing facilities. All of the milk-shed areas are under BMPCUL, the mother organization, which has taken the responsibility to collect milk from rural areas, market this milk and provide dairy services to the rural cooperative members through their own cooperative channel. The coverage of BMPCUL is very limited (about 8% area) in Bangladesh. However, the coverage has been increasing steadily. Within this small coverage, BMPCUL still has been running the seven dairy plants and sharing 60% of total marketed milk in Bangladesh. BMPCUL employs veterinarians in each milk shed area who give door-to-door services to the members. Generally, they visit to the primary dairy cooperatives weekly so that members can receive veterinary services. There is also a provision for emergency call in which members have to just inform to the office. The treatment and AI services of animals are free of costs. Extension program is also important in the context of the development of dairy industry. The extension workers also pay weekly visit to the primary dairy cooperatives. They disseminate the dairy knowledge; such as dairy management, animal health, fodder cultivation, improved milk production and the benefit of maintaining high yielding dairy cows. BMPCUL also has a provision of sending the cooperative members abroad so that they can improve their know-how in dairy cow management. In this regard, BMPCUL selects one or two members rotationally from each primary cooperative and sends them abroad, mostly India. **Figure 1** is the organizational structure of the BMPCUL. It shows individual milk producers make village level primary cooperative. Few of such primary cooperatives together constitute a milk shed. All milk sheds are under BMPCUL. A managing committee of primary dairy cooperative consists of six members including the chairman and vice chairman. All these members of the managing committee are directly elected through the vote of the cooperative members. Managing committee has the responsibility to arrange monthly meeting and discussion with all the respective cooperative members and see their problems regarding milk production and marketing.

Figure 2 shows the flow of milk from the members. The primary cooperative collection centre collects milk from the individual cooperative members in the village. Further, this collected milk is sent to the milk chilling centre or dairy plant. The chilling centre has the responsibility to chill and process the milk. The processed milk is then send to the Dhaka dairy plants or Baghabarighat dairy plant. Dairy plants make various dairy products like butter, cheese, and ice cream and packet the liquid milk. Further, these milk products are distributed to the retailers. Retailers sell the milk and milk products to the consumers.

Figure 3 shows flow of service from BMPCUL to the primary cooperative members. Every, milk shed (Milk Union) has its own veterinary department, extension department as well as marketing department. The veterinary department supplies the available cattle treatment facilities, vaccination and AI services to the rural cooperative members. They are readily available on urgent call from the members. The extension workers train these members for improving the farm management. They also provide available current dairy information to the members. The extension workers motivate non-milk producers to come under cooperative and also make aware of the better dairy farm practices. Cooperatives supply



Source: Field Survey, 2002-03.
Note: MCC = Milk Chilling Centre.

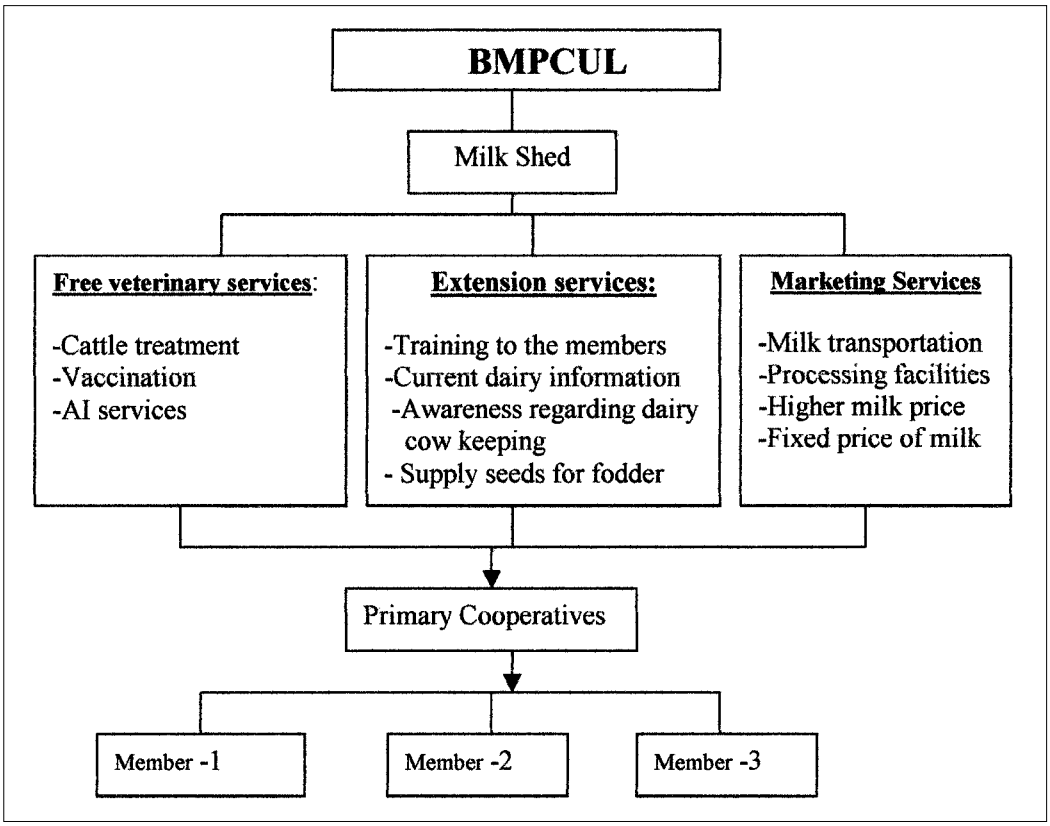
Figure 2: Flow of Milk in BMPCUL (Milk Vita)

seeds for fodder cultivation. On the other hand, marketing department has the responsibility to ensure smooth milk market and better milk price to the members. All these services come from BMPCUL through Milk shed to the primary cooperative in the village. Under such system, cooperative members can easily access all these mentioned services from their respective primary cooperatives.

2.2 Dairy Development Activities

Being the largest dairy organization, BMPCUL has the responsibility of developing the country's dairies to attain the self-sufficiency in milk production. In this way, activities are extended in the selected milk producing areas of Bangladesh for the development of the economic conditions of the rural milk producers, and to encourage dairy cows keeping by giving members remunerative milk prices. Keeping this as the main objective, the BMPCUL has been dedicated, since the early 70's to dairy development in Bangladesh. Considering this situation, this section highlights the dairy development activities of BMPCUL for last three decades.

Dairy development activities include the genetic improvement of dairy cows coupled with vaccina-

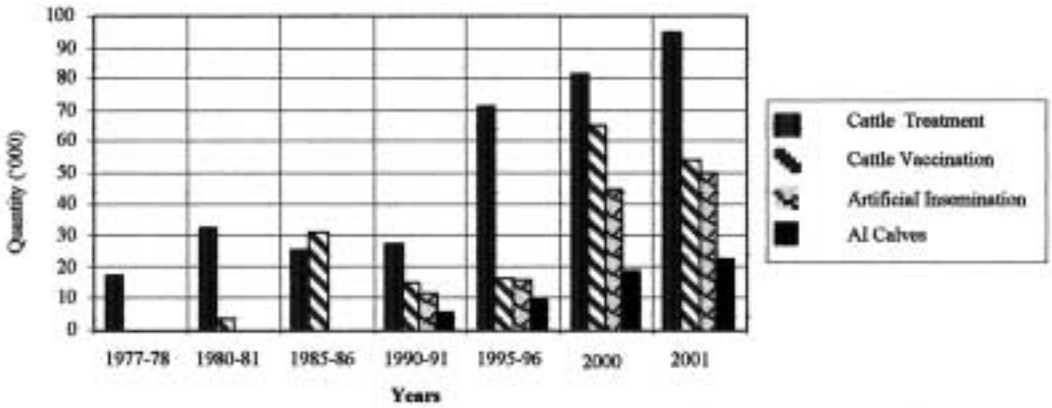


Source: Field Survey, 2002-03.

Figure 3: Flow of Services in BMPCUL (Milk Vita)

tion, better food and fodder, and improved dairy farm management, which in turn increase milk production. Higher milk production per cow means higher income for dairy cow keepers. **Figure 4** shows that the veterinary services of the BMPCUL. In 1977-1978, the BMPCUL started their services in cattle treatment. Gradually they adopted cattle vaccinations, and artificial insemination, which led to increase the numbers of AI calves.

Data show that veterinary services have increased gradually every year. In 1977-1978, the incidences of total cattle treatment were 17,000, which increased to 95,000, in the year of 2001. The same trend was observed for cattle vaccinations. In 1980/1981, the provision of cattle vaccinations was introduced to 1,000 cattle, which increased to 55,000 cattle vaccinations in 2001. AI services were also introduced in 1990 also increased drastically during the decade of 1991-2001. More incidences of artificial insemination has resulted more AI calves, which are growing with the incidences of AI services since 1990-91 to 2001. Data show that, within a short period of time, BMPCUL extended their activities in dairy development in the country. This also indicates that the demand for veterinary service is increasing. In other words, people are adopting AI services and becoming more aware of treatment and vaccinations that became a positive factor for their dairy development.

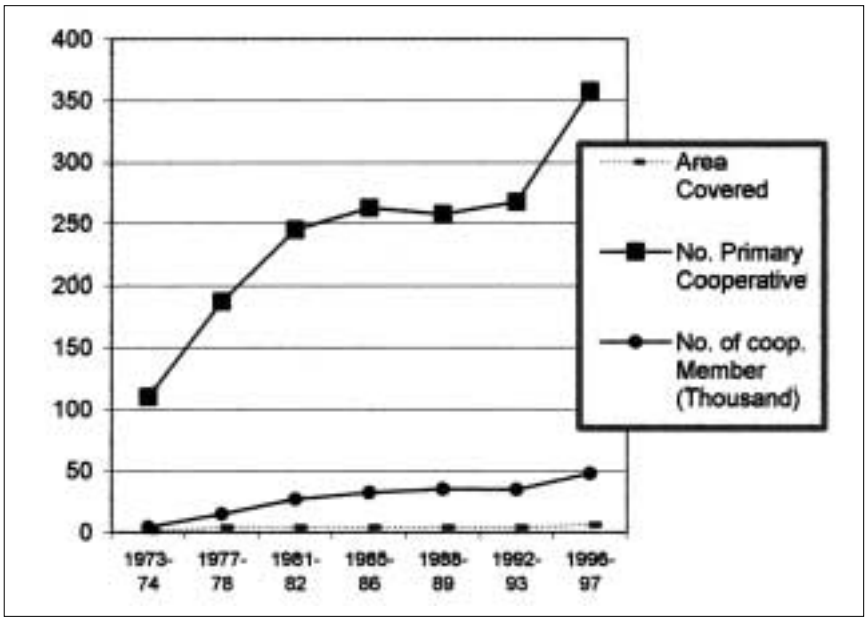


Source: Bangladesh Milk Producers Cooperative Union Ltd. Dhaka. 2002

Figure 4: Veterinary Activities of Milk Vita Dairy Cooperative

2.3 Organizational Activities

The poor and scattered rural dairy cow keepers are not able to develop their milk production by themselves. The government has dairy extension services for rural milk producers, but is unable to provide these services because of the limited resources and manpower. To overcome this problem cooperative dairying was introduced so that dairy cow keepers can have easy access to all the extension services. **Figure 5** shows the chronological development of dairy cooperatives in Bangladesh, their area covered,



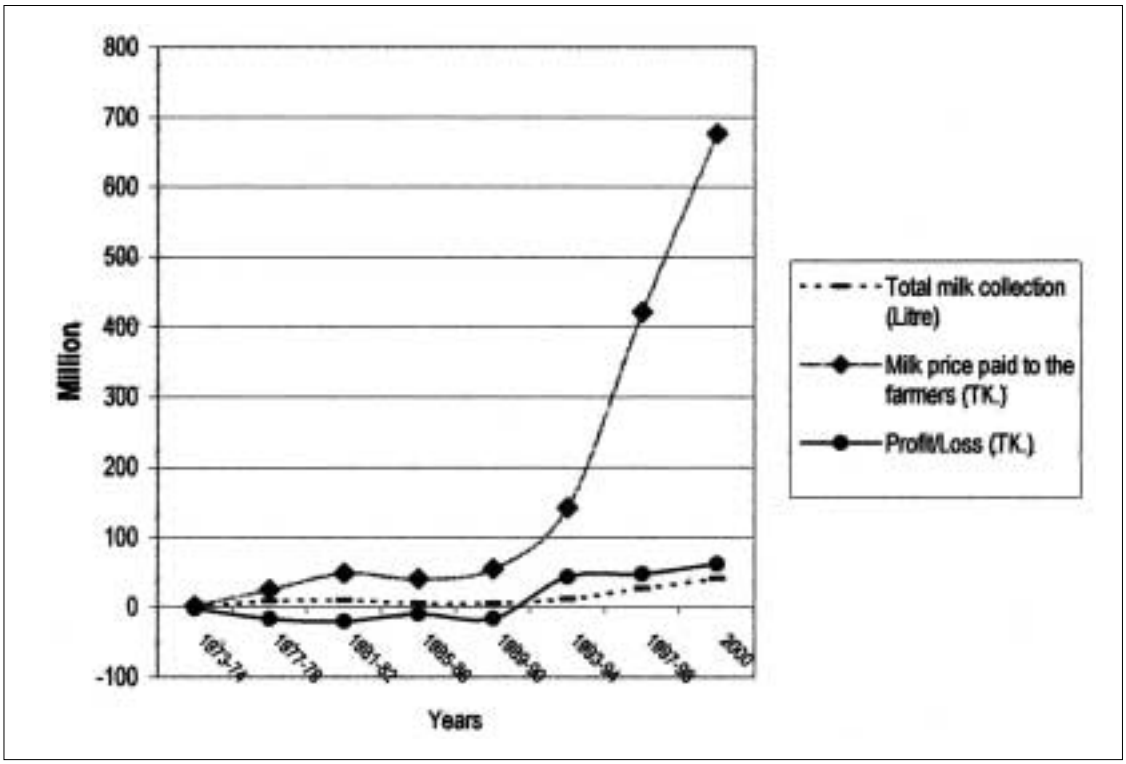
Source: Bangladesh Milk Producers Cooperative Union Ltd. Dhaka. 2002
Note: Area covered means the milk-shed areas under cooperative system

Figure 5: Chronological Development of Dairy Cooperative in Bangladesh

numbers of cooperatives and the numbers of cooperative members. Data reveal that in 1973-1974 all cooperative activities were limited to within one area, but this has gradually increased. In 2001, the activities expanded to 10 areas in Bangladesh. Data also reveal the increase in the number of cooperatives between 1973 and 2001. In 1973-1974, the number of cooperatives was just 100, but this number increased gradually and became 800 by the year 2001. Not only the number of cooperatives, but also the members of cooperatives have increased during this period. In 1973-1974, the total number of cooperative members was less than 1,000. This number has significantly increased and become 60,000 in the year of 1999-2000. The increasing trend of the number of dairy cooperatives and cooperative members shows development of the dairy cooperative in Bangladesh. The cooperative could provide better profit from dairying. This profitability of dairying has attracted milk producers to become cooperative members.

2.4 Milk Collection, its Price and the Losses and Profits of the BMPCUL

BMPCUL is a new and growing organization with the aim of developing dairy cows keeping in rural areas. This will in turn, open up employment opportunities and generate more income for the rural poor milk producers. **Figure 6** shows the amount of milk collection, milk prices paid to members, and the losses and profits of the BMPCUL. Data show that milk collection increased every year between 1973-1974 and 2000. In 1973-1974 the total amount of milk collected was only 0.86 million litres. However



Source: Bangladesh Milk Producers Cooperative Union Ltd. Dhaka. 2002

Figure 6: Milk Collection and Prices Paid to the Members, Losses and Profits of the BMPCUL

in the 2000, the total amount of milk collected was 53.81 million litres. During the same time period, the money, which was paid to the members, has increased accordingly. In 1973-1974, the total milk price paid to the members was only 1.98 million Taka[2], which increased and became 676 million Taka in the year 2000. The BMPCUL was in loss until 1987-1988 but has been making a profit since 1988/1989. Data also show that profit earnings of BMPCUL have been increasing and reached 67.25 million Taka in the year 2001. It means dairy development occurred under the cooperative system in which milk production and milk price received by members have increased drastically within last three decades.

2.5 Market Share of Liquid Milk

Generally in Bangladesh milk is produced and locally consumed. However, in the mega city and other urban areas, milk supply is very limited and people can rarely have access to fresh milk. Only a few private dairy farms supply milk in these big cities. However, the amount of such milk is very little. **Table 1** shows the share of milk marketing among different enterprises. Data reveal that largest quantity (62%) of milk is supplied by BMPCUL compared to Arong (21%), Amomilk (2%), Shelaida (2%) and other enterprises. It is noted that BMPCUL is the only organization, which organized the rural milk producers under the cooperative system. It is the largest milk producing organization and supplied major share of the marketed milk especially in the urban regions. However, the annual nutritional need for milk in Bangladesh is 10.50 million tons against the actual consumption of 1.92 million tons resulting in the deficit of 84.54%. Moreover, only 3.4% of the consumed milk is obtained from processing plant, the rest is locally produced and consumed. Thus, BMPCUL has an enormous scope to expand its activities and provide processed milk and milk products to the consumers through out Bangladesh.

Table 1. Market Share of Liquid Milk Sale (per day)

Name of the Enterprise	Average Milk Sale	Market Share (%)
BMPCUL (Milk Vita)	1,10,000	62.16
Arong	38,000	21.48
Amomilk	4,000	2.26
Shelaida	4,000	2.26
Bikrompur	3,000	1.69
Savar Dairy	3,000	1.69
Aftab Dairy	5,000	2.82

Source: Bangladesh Milk Producers Cooperative Union Ltd. Dhaka. 2002

2.6 Growth of Milk Procurement and Income

Making a great contribution to milk production during the last three decades, BMPCUL also made a significant impact on rural milk procurement and income. **Table 2** shows increased milk supply and milk price paid to an individual member.

In 1988-89, a cooperative member, on an average used to supply only 92 liters of milk annually. However, annual supply of milk per cooperative member has steadily increased and arrived at 825 liters in 2001-2002. During past 13 years the milk supply per member has increased 9 times. More milk supply means more earning from dairy cows keeping. Data also reveal that in 1988-89, a dairy cows keeper used to receive only 887 Taka from the sale of milk on an average. However, with the increase of milk

Table 2. Increased Milk Supplies and Milk Price Paid to Cooperative Members

Year	Milk production per cooperative member (litre)	Milk price received per cooperative member (Taka)
1988-89	92	876
1989-90	145	1,571
1990-91	179	1,925
1991-92	212	2,482
1992-93	294	3,404
1993-94	332	3,910
1994-95	411	5,543
1995-96	402	5,761
1996-97	406	6,356
1997-98	548	8,710
1998-99	597	9,468
1999-00	570	9,184
2000-01	687	11,246
2001-02	825	13,337

Source: Bangladesh Milk Producers Cooperative Union Ltd. Dhaka. 2002.
Note: Total milk production indicates only the amount of milk collected by the cooperative.

supply a member receives 13,337 Taka annually in 2001-2002. Data indicate that the dairy has developed in Bangladesh under cooperative system in which milk supply capacity of the members have greatly improved within last decade.

3. Result of Field Study

Dairy development activities of BMPCUL as a whole were discussed in previous section. BMPCUL is the mother organization and its development activities and services reach through milk shed areas (regional level) to primary milk producing cooperative (village level) under the same area and finally to the respective cooperative members. Present section is dedicated to explore the development activities of a milk shed area named Baghabarighat and a primary milk producing cooperative named, Potajia Primary Milk Producers' Cooperative under its command.

3.1. Dairy Development in Baghabarighat Milk Shed Area

Baghabarighat milk shed is under Shirajganj district northwest capital city of Dhaka where the first dairy cooperative was established. This milk shed consists of 163 primary milk producers' cooperatives. It was observed that Baghabarighat milk shed has its own milk processing center for processing milk and making milk products. All the primary milk producers' cooperatives in this area send their collected milk to this processing center for processing. Finally, the processed milk and some milk products are regularly transported to capital city Dhaka by BMPCUL owned Trucks. The primary milk producers' cooperatives weekly receive the milk price from this milk shed. Like all other milk shed areas under

BMPCUL, Baghabarighat has its own veterinary team for providing medical and artificial insemination facilities to the cooperative milk producers. It also has extension officials, responsible to visit cooperative members, encourage dairying and providing dairy knowledge and suggestion to the cooperative members. They also select new villages for making cooperative, assess its feasibility and if viable they are primarily recognized as cooperative. Putting all effort from all departments Baghabarighat milk shed area has developed dairying in this region. Evidence shows during last decades Baghabarighat milk shed has increased the number of its cooperative and cooperative members rapidly. In 1991-1992, there was 99 cooperatives with 8, 311 members but in 1998-1999 the total numbers of cooperatives and their members have increased and reached 192 and 15,097, respectively. Same trend is also observed in collection of raw milk. This milk shed procured 4,868,614 liters of raw milk in 1991/1992, but milk procurement has increased and become 26,174,856 liters in 1998-1999. Regarding the cattle treatment and vaccination, this milk shed has treated and vaccinated 16,381 and 7,608 cattle, respectively in 1991-1992. However, incidence of cattle treatment and vaccination has increased gradually and become 78,408 and 49,671, respectively in 1998-1999. Not only the milk production, but also the milking cows have increased from 9,015 in 1991-1992 to 33,339 in 1998-1999. The evidence shows dairy development and cooperative activities have increased in Baghabarighat milk shed area as a whole.

3.2 Dairy Development Activities in Potajia Primary Milk Producers' Cooperative

Potajia Primary Milk Producers' Cooperative is under the Baghabarighat milk shed area. Potajia has its own milk collection center at the village. It was observed that cooperative members were bringing milk to the milk collecting point twice a day, morning and evening. The cooperative also has employed person to collect milk and look after all official accounts. The cooperative members are paid milk price weekly at milk procurement time. Cooperative has their own means of transportation (Rickshaw/Van) by which they send their collected milk to the processing center. It has their managing committee comprising of 6 members, elected by the vote of all cooperative members. It was observed that almost all members from managing committee were present while milk was collected. The managing committee calls for monthly meeting among all the cooperative members and discusses the ongoing cooperative matters, milk production as well as problems (if any) of cooperative members regarding the dairy farm management. It was also observed the veterinary team and extension officials from Baghabarighat milk shed area are visiting Potajia primary cooperative at least once a week. The managing committee of Potajia milk Producers' cooperative expressed satisfaction regarding the dairy services received from Baghabarighat milk shed area. Available services provide them an opportunity to develop their cooperative and dairying. Data shows the cooperative members under Potajia cooperative has increased rapidly. In 1991-1992, the total number of cooperative members was only 104, but this became 307 in 1998-99. The same trend is observed for milk production and income generation Potajia cooperative. In 1991-1992, the total milk production was 175,674 liters and the income from it was Taka 2,024,843. But, milk production and the income has increased substantially by 1998-1999, and become 815,631 liters and Taka 11,504,047, respectively. At the same time the number of dairy cows and numbers of artificially inseminated calves also have increased significantly. In 1991-92, the total number of dairy cows and artificially inseminated calves were 511 and 53 respectively, which have increased and become 904 and 230, respectively in 1998-1999. Potajia cooperative developed its dairying and milk production mainly because of the services received from the Baghabarighat milk shed area[3].

3.3 Impact of Dairy Cooperative on Milk Production and Household Income

BMPCUL is also dedicated to rural socio-economic development. At present cooperative members are receiving dairy inputs and fair price for milk in the guaranteed market under cooperative system. Dairy cooperatives also assure them a regular and steady payment in all seasons. Stimulus to production has been such that it continues to attract milk producers to participate in this economic activity under cooperative system. On the other hand, non-cooperative/ traditional milk producers are unable to receive available dairy inputs from government sources. Due to limited dairy resources most of the dairy cows are indigenous and milk yield per cow is low. They do not have organized market to sell their milk and often they sell their milk at low price. **Table 3** shows breeding characteristics of dairy cows, milk production and milk price received by cooperative and non-cooperative members. Data reveal most of the dairy cows from the non-cooperative villages Labutalla (85%) and Nohata (98%) are indigenous, compared to the cooperative villages Potajia (43%) and Vennabari (57%). However, a large percentage of dairy cows from cooperative Vennabari (43%) and Potajia (57%) are crossbred. This indicates that dairy cows keepers under a cooperative system have developed milk cows better genetically when compared to non-cooperative milk producers. The cooperative members gain more economical benefits because crossbreed cows are more milk producing compared to indigenous cows.

Table 3. Breeding Characteristics of Dairy Cows, Milk Production and Milk Price Received by Cooperative and Non-Cooperative Milk Producers.

Villages	Breeding of dairy cows (%)		Milk production per cow / litre	Milk production per household	Milk price taka / litre
	Indigenous	Cross			
Labutalla (non-cooperative)	85	15	840	1,546	11.25
Nohata (non-cooperative)	98	2	621	1,018	13.45
Vennabari (cooperative)	43	57	949	1,557	15.55
Potajia (cooperative)	57	43	1,387	4,785	15.72

Source: Field survey, 2000.

Data also show the higher production of milk in the cooperative villages, Potajia (1,387 litres) and Vennabari (949 litres) per cow compared to the non-cooperative Labutalla (840 litres) and Nohata (621 litres). Higher milk production per cow indicates higher milk production per household in cooperative Potajia (4,785 litre) and Vennabari (1,557 litre) compared to non-cooperative village Labutalla (1,546 litre) and Nohata (1,018 litre). Moreover, the non-cooperative members in Labutalla and Nohata receive only 11.25 Taka, and 13.45 Taka per litre, respectively. However the cooperative members receive higher price with 15.72 Taka and 15.55 Taka for Potajia and Vennabari, respectively.

Data clearly show the dairy cows under cooperatives are mostly improved veraities (crossed breed with higher milk productive species). The improved breed cows are producing more milk for the cooperative members, which have greatly improved the milk production capacity for the cooperative household. On the other hand, cooperative members receive higher milk price compared to the non-cooperative dairy cows keeper. Obviously, the higher milk production coupled with higher milk price put cooperative members in better economic condition. This was possible only because of the cooperative system in which members receive inputs to develop the dairy species and an organized milk market to sell their milk. **Table 4** shows the annual income of the cooperative members and non-cooperative dairy cows

Table 4. Household Income of The Cooperative and Non-Cooperative Milk Producers

Villages	Gross income from dairy[4]	Net income from dairy[5]	Gross household income	Share of dairy income (%)
Labutalla (Non-cooperative)	9,648	2,722	52,690	20.98
Nohata (Non-cooperative)	8,286	1,134	31,177	25.73
Vennabari (Cooperative)	14,989	6,342	47,036	33.41
Potajia (Cooperative)	41,676	31,943	82,072	48.01

Source: Field survey, 2000.

keepers and the share of dairy income to the annual gross household income. Data show that dairy cows keepers from the non-cooperative villages; Labutalla and Nohata are earning less gross dairy income, 9,648 and 8,286 Taka, respectively. However, the gross dairy income for cooperative members in Vennabari and Potajia villages is much higher, 14,989 and 41,676 Taka, respectively. Considering the net income, dairy cows keepers in Vennabari (6,342 Taka) and Potajia (31,943 Taka) earn much higher income compared to the non-cooperative villages Labutalla (2,722 Taka) and Nohata (1,143 Taka). Regarding the share of dairy income data show almost all dairy households are earning significant share of income from dairying. However, share of dairy income is much higher for the cooperative members compared to the non-cooperative dairy cows keepers. Non-cooperative dairy cows keepers from Labutalla and Nohata earn respectively, 21% and 25% share of the total household income from milk production compared to the cooperative members in the villages of Vennabari (33%) and Potajia (48%).

This indicates rural cows keepers in Bangladesh earn substantial share of income from dairy sources. However, the cooperative members are earning better compared to the non-cooperative cows keepers, which help cooperative members to raise total annual gross income. The higher income from milk production was possible because of the dairy development activities undertaken by the BMPCUL.

4. Conclusion:

BMPCUL is a steadily growing organization of the milk producers in the Bangladesh and the pace of its growth in the last three decades is note worthy. The expansion of milk sheds, number of cooperatives and their members during the same period is remarkable. These organizational expansion augmented services, such as, AI, vaccination and other treatment facilities, and cross breed cows which contributed in raising the quality of dairy cows improved the dairy cows keeping in the cooperative area. Presently BMPCUL became the dominant milk producing organization, marketing more than 60% of the total marketed milk in Bangladesh. Within last 10 years, milk collection capacity of BMPCUL has increased drastically. The level of adoption of improved dairy breeds was considerably superior in cooperative villages. At the same time, milk production per cooperative member also has greatly improved. Thus the milk producers of cooperative villages obtained significantly higher milk yields than those from non-cooperative villages. There was significant improvement in the price received by the milk producers of cooperative villages. The dairy cows keepers from cooperative villages have obtained significantly higher dairy income than their counterparts in the non-cooperative villages. Higher milk production and higher income from sale of milk led raise of income for the cooperative members. All these observations lead to the conclusion that the benefits accrued by milk producers is mainly due to the development of

dairy cooperative.

End Notes:

[1] AMUL (Anand Milk Producers' Union Ltd.) has been a highly successful cooperative in India for more than 30 years, owning most well known trade mark food brand in entire India. The Kaira district Cooperative Milk Producers' Union Limited" commonly known as AMUL in Anand of Gujrat. This model of cooperative (Anand) dairying is now being replicated almost all the states of India and two "Operation Flood" programmes (Operation Flood I and Operation Flood II). The original Anand pattern of cooperative was a two-tier cooperative system, but subsequently this pattern was adapted with three-tier system. The basic unit in the Anand pattern is the village Milk Producers' Cooperative - a voluntary association of milk producers in a village who wish to market their milk collectively. All the Village Milk Producers' Cooperatives in a district are members of their District Cooperative Milk Producers' Union. The primary milk producers' societies are affiliated to a district union, which owns and operates a feeder, balancing dairy, cattle feed plants and facilities for production of semen and its distribution. To start with, the dairy cooperative was in village level societies and the district milk union. In 1973, the later (the Kaira District Milk Producers' Union Limited) joined five other such unions in Gujrat to form the Gujrat Cooperative Milk Marketing Federation to manage the functions of marketing of milk and milk products. The federation is third tier in the overall organization of the dairy cooperative structure. This Organizational set up has proved most successful in increasing milk production as well as improving the socio-economic status of small milk producers. The success of the Anand experiment led, subsequently, to the emergency of national dairy development project which has come to be known as Operation Flood i.e. an integrated national dairy development programme whereby the small scale farmers' production (small quantity) is pooled into a "flood". For further details see, FAO (1990), Kulandaiswamy (1986), and Indian Dairy Cooperation Baroda (1983).

[2] Taka is the name of Bangladeshi currency. The value of 1 U.S. Dollar =58 Taka (2003)

[3] See also, Ghosh and Maharjan (2001) for further details.

[4] Gross Income from dairy = Income from sale of milk + market price of consumed milk by producers + income from calves + income from cow dung - total fixed and variable costs.

[5] Net income from dairy = Net income was calculated by deducing all the costs; including fixed and variable inputs costs, and milk producers' self-labour costs, from the total earnings.

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