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Formal Milk Processing Sector in Assam: Lessons to be Learnt from Institutional Failure

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Abstract

Assam initiated organised development of milk processing way back in the mid 1960s. The total installed capacity of pasteurisation and chilling plants in the State is 159 thousand and 28.5 thousand litres per day, respectively. The current scenario of the formal milk processing segment in the state is however, grim. The created infrastructure is either largely defunct or grossly under-utilized. The functional plants are operating at very low level of their installed capacity, have limited product profile, high returns of marketed milk, substantial handling and curdling losses, low productivity of capital and labour and huge operational losses. The poor performance of the plants has been attributed to the establishment of milk processing units without an appropriate assessment of output demand and input supply and ascertainment of economic viability of the plants. In addition, the supporting institutional and infrastructural mechanism has not been put in place and a systematic business and management plan to run the system has not been formulated. Drawing lessons from the institutional failure, the study has suggested some possible interventions and policy initiatives for strengthening the dairy processing activities in the state of Assam.

Background

In India, milk is mostly produced by smallholder dairy producers located in rural areas. Milk is perhaps, the 'only liquid that flows upwards'; its production is carried out in widely dispersed production units in rural areas but its market is largely, in urban areas. For dairying to be an assured source of income for the rural households and to cater to the milk demand of urban consumers, these two groups of stakeholders have to be brought together. The logistical challenge of linking rural producers with urban markets is compounded by the highly perishable nature of milk. Thus, processing is an important component in milk chain, linking the producers to the consumers. However, bulk of raw milk produced in India is marketed in the unprocessed form, notwithstanding the substantial dairy processing infrastructure that has been created in the country in the cooperative sector under the 'Operation Flood (OF)' projects during 1970-1994 and under the private

sector in the aftermath of industrial de-licensing in 1991.

Interestingly, in the state of Assam, organized development of dairy processing infrastructure was initiated even before the launch of OF Phase-I. The first processing plant in the state was established at Jorhat in 1966 with daily milk processing capacity of 5,000 litres. During the 1970s, emphasis was laid on the creation of infrastructure for intermediate preservation of fresh milk and consequently, a number of chilling plants were commissioned in different districts of the state. In the subsequent years, additional processing infrastructure was built up in the state with the initiative from government, and cooperative and private sectors. In recent years, the number of milk pasteurisation plants has increased three-fold, from 3 in 2002 to 9 plants in 2008. The total installed capacity of these 9 plants is 159 thousand litres per day (Lpd), more than double of 2002. The government, cooperative and private sectors account for 17 per cent, 38 per cent and 45 per cent of the installed capacity,

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respectively. The installed capacity of chilling plants was also increased by 8Lpd, 12Lpd and 15.5 Lpd during the 1960s, 1970s and 1980s, respectively. Presently, the total handling capacity of all the chilling plants covered under seven Town Milk Supply Schemes (TMSS) is 28.5 thousand Lpd. The recent increase in the number of dairy plants may be partly attributed to the stepping in of private players in milk processing activities and partly to the increased flow of central and state governments' assistance for upgrading erstwhile chilling plants into pasteurisation plants. However, the current dairy-processing scenario in the state is grim. The created infrastructure is either largely defunct or grossly under-utilized.

With this backdrop, the present study has assessed the performance of milk processing plants in Assam and has identified the inhibiting factors in the development of dairy processing in the state⁵. The study is diagnostic in nature and is based on the review of secondary information (published and unpublished both) and an extensive discussion with stakeholders involved with dairy development in Assam. The stakeholders included dairy development officials, farmers' representatives, personnel of co-operative dairy, private milk processors, NGOs, SHGs and consumers. The performance of the dairy plants and chilling centres has been outlined in the next section, followed by a discussion on the factors affecting the performance of the plants in the next section. In the last section, drawing lessons from the institutional failure, possible interventions and policy initiatives for strengthening the dairy processing activities in the state have been suggested.

Performance of Pasteurisation / Chilling Plants

The availability of data for quantitative analysis of the performance of dairy plants and chilling centres is limited in Assam. However, the available information has been used to study the performance of plants from the perspective of activity status, capacity utilization, growth in milk procurement, product development, etc.

⁵This paper has been drawn from the study on "Assessment of Success/Failure of Milk Processing Plants in Assam", which was a part of the "Comprehensive Study of the Assam Dairy Sector", led by International Livestock Research Institute.

Activity Status and Installed Capacity Utilization

All pasteurization plants in the government sector, except the Jorhat plant (which was closed down in 1997), are functional. The chilling plants are mostly defunct and have been out of use for a decade or longer. Only two of the thirteen plants listed by the Dairy Development Department (DDD), viz., Bokakhat (Jorhat) and N.Lakhimpur, are in operation. However, even the functional pasteurization plants and chilling plants are operating at a very low level of their installed capacity. The Central Dairy, Khanapara, and Dairy Plants at Nagaon and Silchar have around 66 per cent, 70 per cent and 80 per cent idle capacity, respectively (Figure 1), while in the Central Dairy, Tezpur, the unutilized capacity is whopping at 96 per cent. In fact, the capacity utilization of Tezpur Plant may be treated as zero, since, as a result of very low procurement of raw milk, the milk is not pasteurised but only chilled before selling. The problem of unutilized processing capacity is not specific to plants run by the government. The cooperative plant, Purabi Dairy, operates at only one-sixth of its full capacity and private plant, G.R. Fresh, is able to utilize only one-fourth of its installed capacity. The newly commissioned Sarbhog Plant, run by an NGO Asomi, has begun operation with one-fifth of the processing capacity.

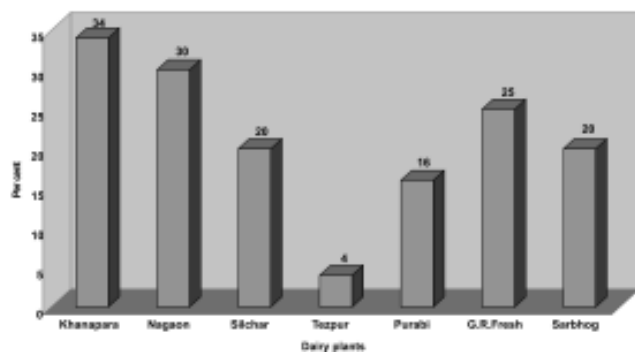


Figure 1. Installed capacity utilization of dairy plants in Assam

The chilling plants in working condition are also grossly under-utilized. The Bokakhat plant procured only 18.4 thousand litres of milk in the first half of 2006-07, i.e., a shortfall of 95 per cent in relation to its capacity (Figure 2). The magnitude of idle capacity was even larger at 98 per cent during 2005-06. The performance of TMSS, N. Lakhimpur, has been even worse with 99 per cent shortfall. The Lahowal Chilling

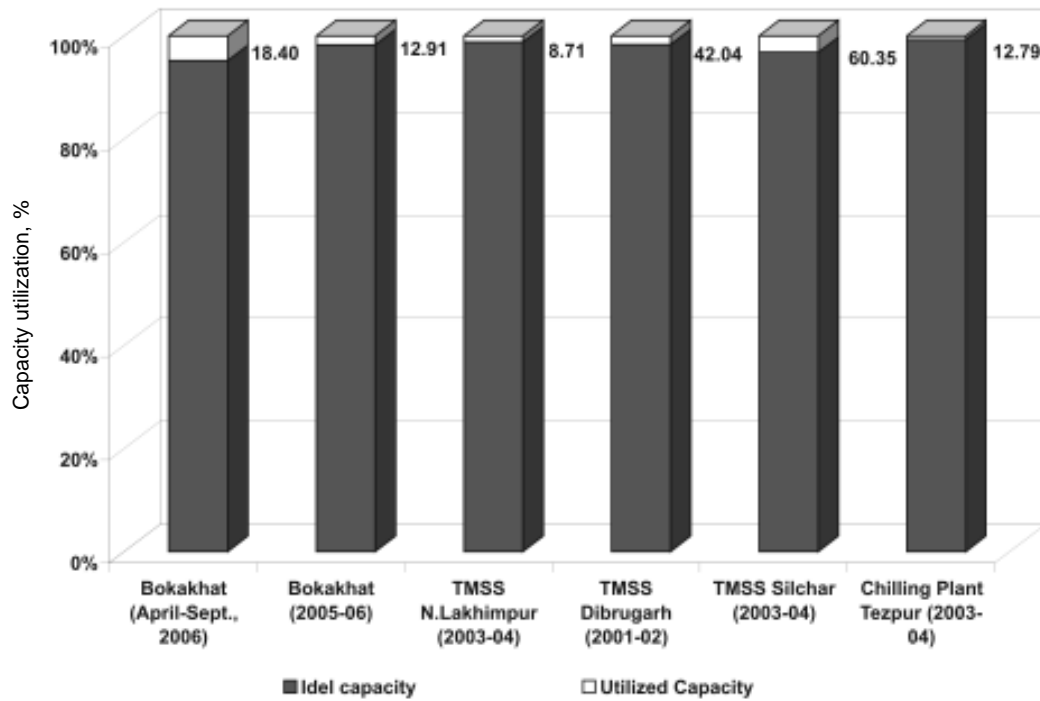


Figure 2. Capacity shortfalls and milk procurement in different chilling centres in Assam

Note: Data labels indicate annual milk procurement in '000 litres

Centre under TMSS, Dibrugarh, was closed down in May 2004. Prior to that, it was running at 95.5 per cent below its capacity of 2500 Lpd. The chilling plant at Silchar, before its upgradation to pasteurisation plant, had 97 per cent unused capacity. The situation of Tezpur Chilling Plant was also quite the same in 2003-04, after which it was converted into a dairy plant.

Growth in Procurement of Milk

The organized sector procures on an average about 0.40-0.45 per cent of milk produced in Assam, which is negligible in comparison to the all-India average of 11 per cent. In the mid-1980s (1985-87), when state government was the only player in the organized milk market, the proportion of milk procured was somewhat higher at about 0.77 per cent (Figure 3). The annual procurement by the government plants fell from over 4 thousand tonnes during 1985-86 to about 3.0 thousand tonnes by the end of 1980s. This decline came largely due to drastic drop in the milk procurement by TMSS, Khanapara (Guwahati) and Jorhat. In 1987, milk producers' cooperative, WAMUL initiated its operation in milk procurement and distribution activities in the milk shed area of TMSS, Khanapara. The rapid decrease in milk procurement by TMSS, Khanapara,

continued during the 1990s, primarily due to the absence of an effective procurement strategy in face of growing competition from WAMUL and milk vendors. The situation also worsened in other milk shed areas like Jorhat, Silchar, Dibrugarh, Tezpur, N. Lakhimpur, Nagaon and Nalbari and in 1998-99, the total milk procurement by the government sector was at the lowest level of 0.31 thousand tonnes since 1985-86, accounting for miniscule 0.04 per cent of milk production in Assam (Figure 3).

In the absence of milk procurement data of WAMUL from 1987 to 2003, getting precise estimates of total quantum of milk procured by the organized sector was difficult. Nevertheless, in view of the present trend in procurement by the cooperatives and based on the discussions with the plant officials and other stakeholders, the overall procurement by the organized sector could be averaged at about 0.33 per cent during the period 1987-2003.

Recent years have shown some positive signs in terms of improved procurement by the government-owned plants to about 1.25 thousand tonnes in 2004-05 (Figure 3). However, despite this improvement, together with stepping in of a private player in the business and revival of dairy plants in Tezpur, Nagaon,

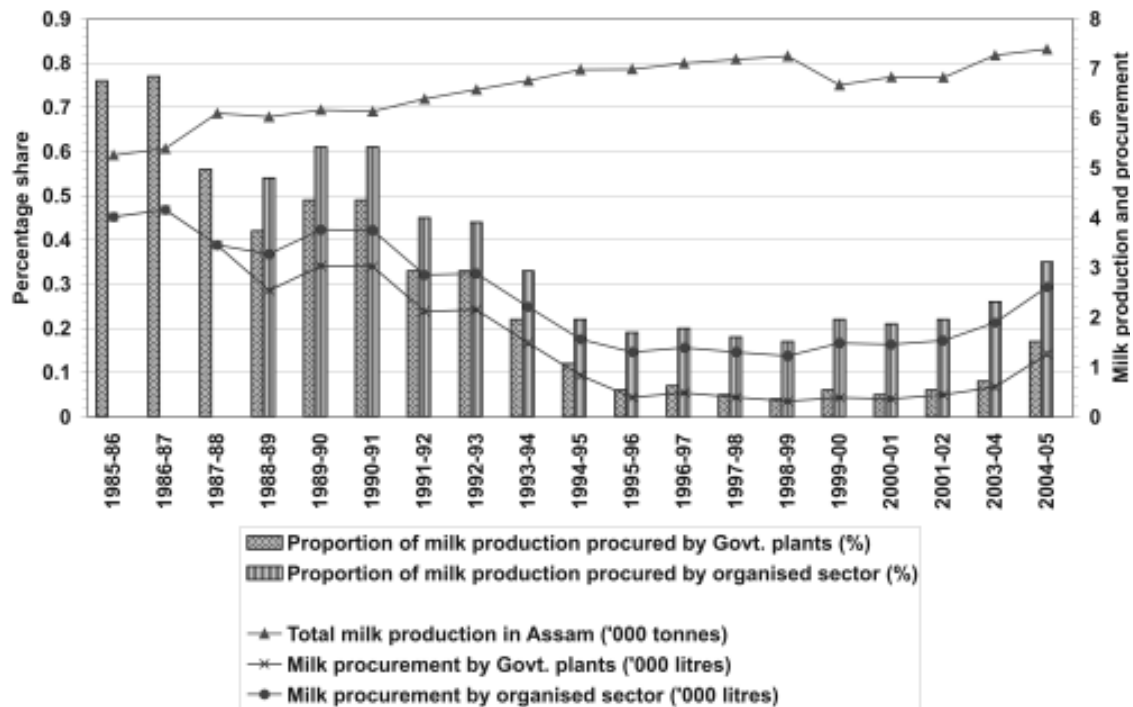


Figure 3. Annual milk production in Assam and procurement by organized sector

Silchar and Sarbhog, the proportion of milk production in Assam flowing through the organized sector continues to be negligible.

New Product Development

The dairy plants in Assam, particularly in the government sector, have a limited product profile and broadly, it has not undergone major changes during the past two decades. The processing plants mostly market pasteurized fluid milk. The Central Dairy, Khanapara, was selling only double toned milk (Fat, 1.5%; SNF, 9.0%) till 2004-05. In 2005-06, another variant of processed milk, viz. toned milk (Fat, 3.0%; SNF, 8.5%) was launched. Besides fluid milk, the plant also manufactures dairy products like paneer, plain curd, sweet curd, yoghurt, and flavoured milk in small quantities against specific orders. The product profiles of Purabi Dairy and G.R. Dairy Pvt. Ltd. are also more or less similar. Besides the products mentioned above, Purabi Dairy also manufactures lassi and cow ghee in limited quantities, while G.R. Dairy also markets full cream milk. The product development in the dairy plants outside Guwahati is negligible. In fact, the liquid milk sold by Nagaon and Sarbhog plants is unstandardised pasteurised milk, while Tezpur plant sells unpasteurised milk.

Handling and Curdling Losses

Over the years, the percentage of milk handling and curdling losses ranged from 1.8 per cent to about 7.9 per cent of the total milk procurement (Figure 4). Delays in milk collection and transportation to the plant, inadequate intermediate milk preservation facilities, etc. lead to frequent curdling of large quantity of milk. Sourage losses is a problem that afflicts all the plants/chilling centres in Assam. In fact, sometimes these losses are of very high magnitude; for instance, Tezpur plant lost 11 per cent (1.5 thousand litres) of its milk procured in the year 2003-04, while in Bokakhat, Jorhat, 34 thousand litres (26% of procurement) of milk curdled in 2004-05.

The NDDDB team, appraising the condition of dairy plants in Assam, also assessed high fat and SNF losses. In the Central Dairy, Khanapara, fat losses were reported to be whopping 20 per cent in May 2005 (Table 1). In other months of the year, except August, the losses were on the higher side. Similarly, in the Silchar plant, the fat losses were generally high (Table 2). The primary reason for these losses was low volume of handling and factors such as inaccuracies in the measurement of fat, inaccurate weight of consumer's packs and improper flush recovery.

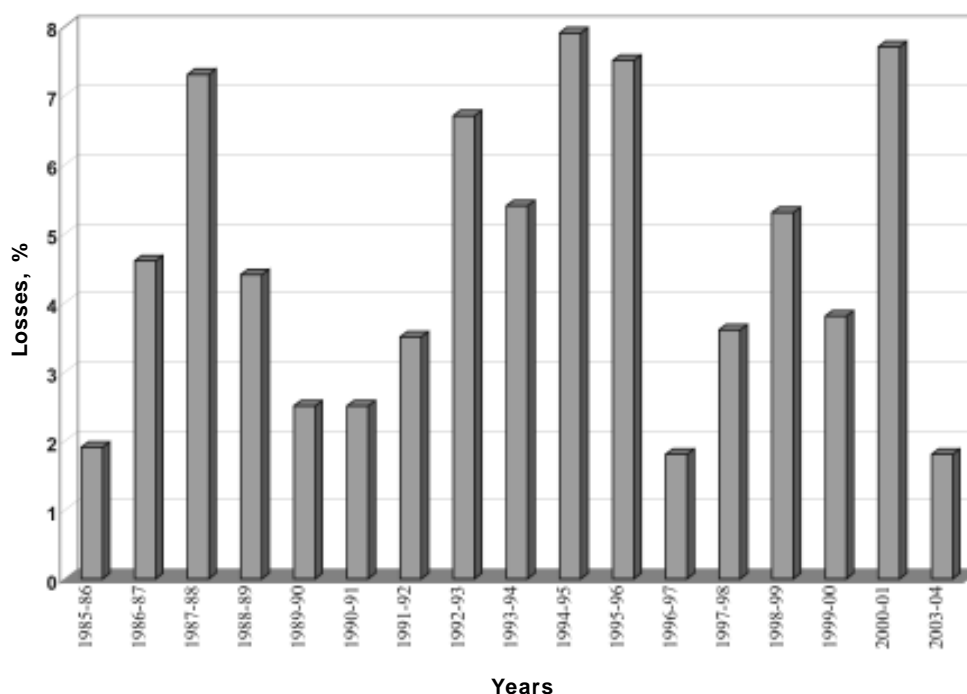


Figure 4. Percentage of milk handling and curdling losses in government plants in Assam

Table 1. Estimates of fat losses in Central Dairy, Khanapara, Assam: 2005

Month	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Loss, %	5.73	12.5	17.58	8.57	19.90	6.75	5.49	0.09	2.80	2.62	2.03	3.85

Source: NDDDB (2005)

Table 2. Estimates of fat and SNF losses in Dairy Plant, Silchar, Assam: 2005

Date	Fat loss (%)	SNF loss (%)
Aug. 1, 2005	3.10	-0.52
Sept. 1, 2005	0.03	-2.76
Oct. 1, 2005	3.24	1.93
Nov. 1, 2005	5.07	15.63
Dec. 1, 2005	3.13	6.47
Jan. 1, 2006	9.07	2.43

Source: NDDDB (2005)

Market Returns

Discussions with the plant officials of Central Dairy, Purabi and G.R. Fresh revealed that in all the plants about 10-11 per cent of the milk packets return unsold from the market. A much larger quantity of market

returns in Central Dairy, Khanapara, ranging from 17 per cent to 27 per cent in the first eight months of 2005, has been reported by the NDDDB team (NDDDB, 2005). As these packets are re-processed, it entails additional loss in terms of cost of re-processing and transportation charges. The high proportion of market returns are indicative of improper sales monitoring and marketing strategy, inadequate sales promotion and demand constraints.

Principal Characteristics of Dairy Industry

A comparative analysis of some important structural ratios for the dairy industry in Assam vis-a-vis all-India scenario further substantiated the precarious condition of formal milk processing sector in Assam.

The average installed capacity of a dairy plant in Assam is quite low in comparison to state-of-the-art

Table 3. Selected performance indicators of dairy industry

(Amount in million Rs)

Performance indicators	All-India	Assam
Fixed cost per factory	27.27	15.94
No. of person engaged per factory	90	41
Capital productivity	0.086	0.035
Labour productivity	0.26	0.13
Ratio of fixed cost to value of output	0.11	0.81
Cost of creating a job	0.30	0.39

Source: Based on characteristics for factory sector by major industry group (3-digit) under *Annual Survey of Industries* (2004-05)

large dairy plants in other parts of the country. Hence, the fixed capital and number of persons engaged per factory are much lower in the state as compared to the all-India average. The productivity of capital and labour as captured through the ratio of net value-added to fixed capital and net value-added to total persons engaged shows striking differences at the state and all-India levels. The annual productivity in per unit of fixed capital is only Rs 35 thousand in Assam, less than half of all-India average of Rs 86 thousand per annum. Similarly, the productivity of labour is two times lower in Assam.

The capital productivity is low largely because of unused installed capacity of plants. As a result of idle capacity, the ratio of fixed cost to value of output is as high as 0.81, while it is only 0.11 at the all-India level. The low labour productivity in Assam has led to high cost of creating a job, that is, fixed cost per employee is quite high in the state (Rs 0.39 million).

On the whole, the dairy industry was a loss-making entity in Assam (profits Rs -2.5 million in 2002-03), although at the all-India level it earned a profit of Rs 12071.6 million in the same year. The operational losses in selected dairy plants and chilling centres have also been brought out in the State Audit Report (CAG, 2003). As per the information from the receipt and expenditure statement of five functional dairy/chilling plants in Assam, it was noticed that although the basic concept of setting up of TMSS was to run on 'no profit-no loss basis', they sustained operational loss of Rs 31.4 million during 1998-2003 (Table 4). This included wages of muster roll workers, salary of idle drivers, handling and recombination losses, loss due to non-accounted

returned milk and energy bills amounting to Rs 26.6 million (Table 4), but excluded the regular staff salary and capital cost of land, building, plant & machinery. The operational loss increased four times to Rs 128.2 million on including the staff salary.

Factors Inhibiting Performance of Dairy Plants in Assam

Detailed discussions with different functionaries in the plants, officers in-charge, extension personnel, milk producers and various other stakeholders in the government, cooperative and private sectors revealed supply and demand-side constraints, administrative issues and lacunae in planning and co-ordination that have led to virtual collapse of the institutional setup of organised milk processing in Assam.

Supply Side Constraints

One of the main reasons for poor capacity utilization of the plants is low procurement of raw milk from the milk producers due to several factors, some of which are discussed below:

Inept Procurement Pricing

In consonance with the general norm, the dairy plants in Assam generally follow two-axis pricing policy [fat and solid-not-fat (SNF) basis] for procurement of milk. The milk procurement price of dairy plants was about Rs 14-15 per litre in 2006 (4% fat, 8.5% SNF). The nominal price remained stagnant for six years, from 1998 to 2004. The marginal revision in 2004 was inadequate to compensate for the increase in wholesale price index (WPI) of milk, which had moved from 125.5 in 1997-98 (base 1993-94) to 176 in 2003-04. It implied a sharp fall in real procurement price of milk (nominal procurement price deflated by WPI of milk) during this period (Figure 5). The upward revision made in 2004 did not restore the real price even to the 1998 level. After 2003-04, the WPI of milk increased further to 184.3 in 2005-06, but no revision was made in the price paid to milk producers.

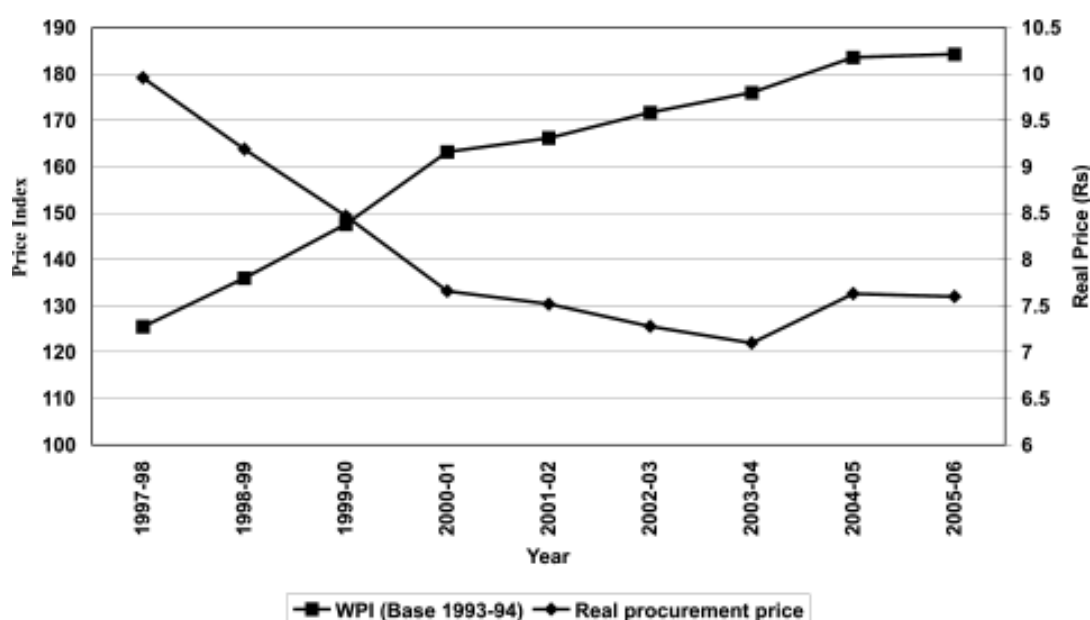
Dairying in the peri-urban Assam is based on high cost concentrate feed input due to shortage of green fodder and grazing land. From discussions with the milk producers, it emerged that out-of-pocket expenses worth Rs11-12 were incurred for producing one litre of milk. Hence, producers, particularly in the peri-

Table 4. Working results of selected TMSS in Assam : 1998-2003

(Amount in million Rs)

Name of TMSS	Receipt	Expenditure	Operational loss	Overall loss inclusive of staff salary
Guwahati	35.6	52.5	16.9	52.9
Jorhat	1.6	5.2	3.6	28.7
Tezpur	0.5	4.0	3.5	13.9
Dibrugarh	0.6	5.3	4.7	23.6
Manja	1.7	4.4	2.7	9.1
Total	40.0	71.4	31.4	128.2

Source: CAG (2003), p.49

**Figure 5. Movement in all-India wholesale price index of milk and real milk procurement price in Assam: 1997-98 to 2005-06**

urban areas, find it more lucrative to sell milk to the unorganized sector or supply directly to the customers, whereby they earn a rupee or two more per litre of milk.

Besides low procurement price, delay in payment to milk suppliers was another important factor that hampered milk procurement by dairy plants. The Central Dairy, Khanapara, alone owed a payment of about Rs1.4 million at the time of study in 2006.

The Purabi Dairy has also not been an efficient paymaster, and on several instances, payments to farmers remained outstanding for more than a month. The outstanding payments to milk suppliers by Tezpur Dairy, sometimes even for more than 2 months proved to be a stumbling block for the efforts made by the

Spear Head Team (SHT) to increase the supply of milk to the plant (NDDB, 2005).

Lack of Effective Milk Collection Network

The price of milk offered by the organized sector may not be adequately remunerative for the urban/peri-urban producers of Assam, but it may not be the case for the rural milk producers, due to low input-intensive production system and the poor access to more lucrative alternative milk marketing channels in the rural areas. The lack of efficient procurement network constrains the flow of milk from rural areas to dairy plants.

A large number of chilling plants, located in various parts of the state, deemed fit according to

availability of milk. But, these units do not have the support of streamlined milk collection facilities. The dairy plants and chilling centres do not have transport facilities for collecting milk from the rural areas to ensure timeliness in milk collection from the producers and its transportation to the preservation/processing unit, which is very critical in maintaining the quality of milk and avoiding spoilage losses. The problems like frequent breakdowns of transport service, lack of finances for repairing, etc. led to high curdling of milk and shook the producers' confidence in organized milk procurement system.

Absence of Non-price Incentives

Besides monetary incentives, the provision of non-price incentives by the dairy plants, in the form of supply of quality feed inputs, regular veterinary medicare services, artificial insemination (AI) facilities, extension services, training to the milk producers, etc. are instrumental in ensuring higher supply of milk to the plants. In fact, the major strength of the three-tier milk cooperative structure in Gujarat, besides providing marketing support to the milk producers, lies in its ability to provide input and service support to its producer members. Several private plants such as Nestle plant in Moga, Punjab, have also secured their regular milk supply by providing various services to the milk producers in their area of operation. Unfortunately, the milk plants in Assam either do not provide any kind of non-price incentives to the producers or the milk producers are not appreciative of the quality of inputs or services provided by them.

Demand Side Constraints

The organized processing of milk in Assam is caught in a vicious circle of low demand and low supply. In view of over 10 per cent market returns of milk at the existing low level of production, the plants are wary of increasing production. Milk and milk products are not an essential component in the daily consumption basket of people in the state. Only 46 per cent of rural households in the state consume liquid milk. Among the urban households, the consumption of milk and milk products is relatively higher than their rural counterparts (116 per cent more in quantity terms), but the overall demand in the state is lower than the national average (NSSO, 2001).

In the urban areas, with changing lifestyles, the consumption of products like cheese, paneer, yoghurt,

etc. is slowly picking up. In the fluid milk segment, a larger proportion of consumers is not a customer of processed milk from dairy plants in the state, instead it prefers UHT milk and/or milk powder or buys unprocessed milk. This indicates that this segment of the consumers is either not satisfied with the quality of the product from local dairy plants, or the same is not readily available to the interested buyers or they are not quality conscious and continue to buy unprocessed milk.

Administrative Constraints

The success of an organization depends heavily on the prompt decision-making and its execution by the management. In the case of a dairy plant, the need for speedy implementation of decisions becomes all the more pertinent for successful functioning of a plant, due to highly perishable nature of the commodity under process. The operation of dairy plants under the government setup is confronted by long delays in decision-making, complex nature of rules and regulations and several other administrative hurdles.

The plant managers have not been delegated with financial powers to tackle contingent expenditures in day-to-day running of the plant. The plant managers have almost no say in the procurement and marketing strategies. Even in plants where private collaboration is in place (i.e. Nagaon, Sarbhog and Silchar), the decision-making body for major decisions like, procurement and sale price of milk does not have any representative of the private collaborator. Instead, the local advisory committee headed by the District Magistrate and other government officers takes all such decisions (NDDB, 2005).

Shortcomings in Planning and Coordination

The performance of the dairy plants has also been adversely affected by weaknesses in planning and coordination at various levels.

Lack of Procurement and Marketing Strategy

The setting up of dairy processing infrastructure in Assam has not been supplemented with a long-term systematic procurement and marketing strategy.

Prior to the launching of Assam Agricultural Competitiveness Project (AACP), a World Bank aided programme, no organized efforts were made for

backward integration in the milk-shed areas to enhance milk production and streamline institutional and infrastructural arrangements for milk collection. Under the AACCP, attempts are made to organize village level milk producers' organizations and self-help groups (SHGs) for channelising milk supply to the organized sector. However, these efforts did not yield the desired results in terms of substantially higher milk procurement because of low volume of milk marketing, absence of backup support mechanism such as milk testing equipment, etc. before starting milk collection from the producers (NDDDB, 2005), delay in payments, only one-time milk procurement in a day by the milk plants, etc.

The marketing of milk and milk products in Assam is on a small scale, partly because of demand-side constraints and partly because of lack of effective marketing strategy to overcome the demand-side constraints. The dairy plants do not allocate any resources for sales promotion. At times, packaging of products is not consumer-friendly, for instance, curd is sold in half kg and one kg capacity earthen pots by the Central Dairy, Khanapara. In contrast, Purabi Dairy has made some attempts towards increasing its consumer outreach. It supplies curd in small easy-to-carry plastic cups which find better consumer acceptance.

By and large, the dairy plants have been established without a thorough assessment of the market demand in terms of types of products, their volumes, prices and income elasticities and the competition from other brands. Similarly, lack of proper planning and coordination is also reflected in establishment of more than one dairy plant in the same milk-shed area or locating it very distantly from the milk pocket.

Lack of Coordination among Government Departments

The dairy development activities in Assam have been grouped into two segments: production and distribution. The production-related activities such as health care, management, breeding, artificial insemination, induction of new cattle, etc. are taken care by the Animal Husbandry and Veterinary Department, while the distribution aspects, viz. milk procurement, processing and marketing are under the aegis of Department of Dairy Development (DDD). A third government department, Ministry of Cooperation,

is also indirectly involved in the dairy development efforts, as it is responsible for registration of the dairy cooperative societies. A close coordination among these departments is a pre-requisite for an effective outcome since production and distribution of milk are the two sides of the same coin of dairy development. The officers and extension workers under the DDD were of the view that in areas where they are initiating activities for enhancing procurement, processing and marketing of milk, their efforts get nullified to a large extent, due to lack of input services to the dairy farmers that have to be provided by the Animal Husbandry & Veterinary department.

Poor Human Resource Development

The neglect of human resource development has also contributed to the poor performance of the milk processing units in Assam. Lower emoluments to professionally qualified employees as compared to their counterparts in the dairy industry in other states and extremely limited career advancement avenues are some important issues that have not been adequately addressed. In the past 20 years, there has been no streamlined promotional policy in place and most of the younger staff is stagnating in the same position on which they had joined nearly two decades ago. Besides lower emoluments and stagnancy in jobs, no attention has been paid towards the training and skill upgradation of the staff.

Learning from Institutional Failure: Suggestions for Improvement

On the basis of a large number of internal and external inhibiting factors responsible for the failure of formal milk processing sector in Assam, some important lessons can be drawn to bring this sector back on the track.

First is the re-structuring of institutional arrangement for running the dairy plants and gradual withdrawal of the government from the same once the non-government agency is technically and financially equipped to handle all the operations of the plant. A majority of the dairy/chilling plants in Assam are under the direct control of the government, unlike the all-India scenario. It is amply evident from the previous sections that there has been a lack of commercial environment and orientation in managing the milk processing plants under the government control in the

state. Therefore, government should gradually withdraw its direct involvement in the dairy-processing activities, instead it should play the role of a facilitator in linking the milk producers to the organized processing sector which is professionally managed by co-operatives, NGOs and private agencies.

The recent approach of encouraging public-private partnership for the operation of dairy plants is a positive step in this direction. However, to ensure stability and continuity of such partnerships, it is imperative that modalities for the successful involvement of a private party and role and responsibilities of each of the partners are worked out carefully. Frequent changes in the institutional arrangement for procurement and marketing of milk create uncertainty for milk producers, shake their confidence in the organized sector and prompt them to look up towards unorganized channels for milk marketing.

The re-structuring of existing institutional arrangements should go hand in hand with the efforts to tackle the demand and supply side constraints. On the demand side, there is an urgent need to launch a massive consumer awareness campaign to apprise the consumers that the value-added products of the organized sector are better than those of the unorganized sector from the health and public safety aspects. The government, in close liaison with other non-government players in the dairy processing industry, should take the lead in generating this public awareness. Another important dimension of demand that merits attention is tapping the segment of consumers purchasing UHT milk by creating confidence in the locally processed milk. The preferences of this section of consumers are not determined by the prices and therefore, quality improvement and assurance would be the key. A thorough assessment of the determinants of consumer preferences and formulation of appropriate market promotion strategies will be instrumental in overcoming the demand-side constraints.

To manage the supply-side constraints, the dairy plants should offer reasonable prices to the milk producers and a fair share in consumers' rupee. The role of non-price incentives to milk producers, as discussed earlier, is equally important in ensuring milk supplies to the dairy plants.

The low marketed surplus of milk in Assam makes the logistics of its collection from rural areas more complex and expensive. The milk-producing households in the rural Assam, on an average, produce about 1.5-2.0 litres of milk per day. Taking into account that this low level of milk production will lead to low marketed surplus, the steps for collective pouring of milk at the producers' level need to be planned as part of the collection mechanism. In this regard, the government should organize the SHGs/DCS and motivate the farmers to supply milk to the organized sector. After organization of SHGs, the government should facilitate higher milk collection through development of an efficient input-support system and training of milk producers for adopting scientific dairy farming practices. This aspect, taken up as an important component of the dairy development under the AACP, has started showing positive results. Such efforts will also help in attracting private investments in dairy processing sector.

Thus, to revitalize milk processing units under the administrative control of the government, the existing institutional mechanism should be reformed by granting autonomy to the management, initiating performance-based incentives to the employees and increasing their accountability to the system. Future investments in creating additional dairy processing infrastructure should be preceded by sound *ex-ante* investment feasibility study and a well planned procurement and marketing strategy. In nutshell, instead of piecemeal efforts, a holistic approach is required for boosting the formal milk processing sector in Assam and effectively linking the milk producers in the value chain.

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