

PERFORMANCE OF COOPERATIVE DAIRYING IN ASSAM: AN ECONOMETRIC ANALYSIS OF FORMAL DAIRY VALUE CHAIN

Deepshikha Dutta, Deb Kumar Chakraborty

Professor, Department of economics, Dibrugarh University

Abstract

In India, livestock and dairy sector is considered as an engine of agricultural growth in the country. The operation flood programme (1970) owes its genesis to cooperative dairying and the beginning of cooperative dairying in India can be linked with the establishment of Kaira Cooperative at Anand, Gujarat. However, the status of cooperative dairying in Assam is far from its potential performance in terms of production and coverage. The present study is an attempt to analyse the performance of formal dairy value chain in Assam that follows the Anand pattern cooperative dairying model. The important findings from the study indicate that there exists two main underlying dimensions in the performance of cooperative dairying in Assam, i.e., financial and physical indicators and attention should be given considering the results of overall weightage average of these indicators to improve the performance of the formal dairy value chain.

Key words: Cooperative dairying, Physical indicators, Financial indicators, Weightage average

1.1 Introduction:

Dairy development in India has made progress with the establishment of dairy cooperatives which are organised by the milk producers at farm level. Indian dairy has travelled a long way with a very low level of milk production of 17 million tonnes in the year 1951 and per capita availability of just 130 gram per day to the largest milk producing country with milk production of 176.3 million tonnes and per capita availability of 375 gram per day in year 2017-18. This tremendous growth in the dairy industry sector is indeed due to the growth of dairy cooperatives. Operation flood owes its genesis to Anand pattern cooperatives. The objective of operation flood was to replicate this pattern throughout India. The National Dairy Development of Board (NDDB) formulated the operation flood programme (1970) in phased manner and has made dairy farming India's largest self-sustaining agricultural dairy development programme. In the year 2017-18, there were around 186 thousand village level Dairy Cooperative Societies (DCS) in the country and which had a total membership of 16.6 million milk producers and the daily milk collections of the cooperative milk unions was around 475.6 lakh kg/day (NDDB, 2018). India's livestock sector is one of the largest in the world (FS, 2018) and dairying in India being an important secondary source of income, more than 16 million rural families are engaged with this sector. Hence, livestock and dairy sector is considered as an engine of agricultural growth in the country.

1.2 Cooperative movement in Indian Dairy sector:

The beginning of cooperative dairying in India can be linked with the establishment of Kaira cooperatives at Anand (now popularly known as AMUL) in Gujarat in January 1946. The

cooperative dairying is also referred to Anand pattern, which operates at three hierarchical level, i.e. at villages, districts and one state level apex body. In the Anand pattern dairy cooperative structure at the village level dairy cooperatives collect milk from member farmers and through a quality control management transport the procured milk to the dairy processing plant at district level, which is also called as district milk union. The district milk union manufactures milk and milk products. Now in case of surplus milk producing states like Gujarat, several district level milk union procured and produced milk and milk products at large scale, which are being marketed and distributed in national and to some extent operating in export market through an apex body called GCMMF (Gujarat Milk Marketing Federation), a state level milk marketing federation.

1.3 Role of Dairy sector in Assam:

Assam economy continues to be an agrarian economy as more than 85 per cent of the population is living in the rural areas and about 52 per cent of the total labour force is found to be engaged in agriculture and allied activities. Dairy sector has significant impact on employment generation in the state and plays a vital role in income generation of both rural and semi-urban economy. A variety of institutional and infrastructure supports are required to facilitate growth of sector. These may include credit institutions, farmer training facilities, dairy farmer cooperatives, milk unions, R&D and extension services. The status of dairying in Assam is far from satisfactory in terms of production and coverage despite the fact that there lies enormous potential. The per capita per day milk consumption in Assam is only 74 ml as against 208 ml per head per day as recommended by ICMR. Both formal and informal milk market exists in Assam, but the role of dairy cooperatives in procurement of milk and providing necessary services to the dairy farmers make them distinct among the other channels of milk marketing. Once dairy production begins, a milk collection and cooling centre (BMC) is required to collect milk from the dairy farms and then to transport the milk to a milk processing plant for processing and packaging as well as marketing of the products. In 2015-16, the total members of dairy cooperatives stood at 16 thousand in Assam and also as per NDDDB annual report, the percentage share of Assam in total milk procurement by cooperative sector in India was only 0.05. However in Assam West Assam Milk Union Ltd. is the only functional state level formal dairy value chain, partially operational within Brahmaputra valley, provide extension support and a stable price for the produce of the farmers associated with the dairy cooperative societies within the supply chain.

2. Review of literature:

Organisational design and structure relates to the level of autonomy and organisational structure is about the formal specification of different roles for members, to ensure that activities are carried out. Structural arrangements influence the efficiency of work (Chenhall, 2003). (Rajendran & Mohanty, 2004) Studied the constraints and opportunities related to dairy cooperatives and milk marketing in India and they conceded that the major constraints in milk marketing is the involvement of the unorganized sector. Changing the dairy cooperatives laws and regulations can reduce the unorganised sector's role in milk marketing. Strengthening the infrastructure for milk collection, transportation, processing, packaging, pricing and marketing through dairy cooperatives can also change the minds of milk producers. Producer's bargaining power and the lack of proper infrastructure for transportation, distribution and storage are other

constraints which make milk procurement difficult. It is possible to overcome these challenges by strengthening the dairy cooperatives. (Chand, Swami, & Tipnis, 2015) Carried out a study on which pointed out that while livestock farmers struggle to keep their farms competitive and profitable, livestock farming in India is being challenged with the dairy sector still remains in the hands of small, informal unorganised players. Other developed dairy nations worldwide observe modern dairy industry concept at a large scale. In the absence of any rigorous effort on part of the government to promote the development of large scale dairy plants in India, the Indian dairy industry became muddled with numerous sub-optimal plants in India and a large informal sector. (Karki, 2005), in his study concluded that dairy cooperatives is a very popular business not only in developing countries but also in developed countries like USA, Germany etc. But the strategic planning of developed countries is quite different from the strategic plan of developing countries. In India, most of the dairy cooperatives have used Anand pattern of organisational structure and have given emphasis on internal improvement such as improvement in management, increase in production volume, improvement of quality of product. However the developed dairy nations strategic planning is to merge different dairy cooperative societies/institutions into a dairy cooperative and to compete in the global market with quality of products. (Nitin, 2008) Carried out a comparative study on supply chain management in private and cooperative dairy processing units. According to his findings the procurement pattern of raw milk by the private sector unit involved many intermediaries unlike cooperative societies which functioning has been done by group of milk producers themselves.

(Kunte & Patankar, 2015) Made a review of 24 research article related to dairy industry. The papers covered six geographical regions of India- South, West, North, North-East, North-central and East. Total 14 of 24 studies were based on primary data collected from dairy farmers (members of cooperative societies and non-member). The major findings in these 14 research papers were small herd size, dairy farming is still in the form of a source of livelihood and not commercialized and cooperatives have positive impact on milk production and income generation.

3. Statement of the problem:

The supply chain begins from the farmers from whom the milk is collected and the procurement of milk through further quality control measures done by dairy cooperative societies. Primary level studies in case of Assam dairy sector have been found that basically concentrating on existing unorganised and traditional milk market and producers. The major issues reflected in these studies were related to the scarcity and high cost of fodder and concentrates, irregular and lack of veterinary and extension services followed by low level of milk production. Therefore the present study is an attempt to analyse the performance of organised dairy value chain that follows the Anand pattern of cooperative dairying.

Formal Dairy Value Chain in Assam

As per record, there were three milk unions in Assam covering most of the districts of the state, i.e. EAMUL, CAMUL and WAMUL. However only WAMUL continues to remain operational covering some milk-shed districts of Brahmaputra valley. The turnaround of West Assam Milk Union Ltd. (WAMUL) since 2008 under the management of National Dairy Development Board (NDDB) reaffirmed the confidence that the cooperative institution can be the engine of

formal dairy value chain in Assam. Also the functioning of WAMUL through dairy cooperative supply chain, followed an inherent homogeneous structure in operations through village dairy cooperative societies at the bottom producer level, homogeneity in organisational structure at procurement level, homogeneity in terms of management and quality control activities, capacity building, following strategic planning as well as in implementation of funded programs.

Objectives of the study

- 1) To analyse the performance of formal dairy value chain practices in Assam.
- 2) To assess the magnitude of indicators influencing the performance of formal dairy value chain in Assam.

4. Data sources and methodology:

West Assam Milk producers Union Ltd. (WAMUL), established on June 6, 1981 has been selected for the present investigation. The secondary data pertaining to analyse the performance of the milk union has been collected from the state level milk union itself, focusing on two main underlying dimensions namely Financial and Physical indicators (Table 1), over a period of five years from 2017-18 to 2021-22.

Table 1: Financial and Physical indicators

Sl no	Particulars	Unit	2017-18	2018-19	2019-20	2020-21	2021-22
Physical indicators							
1	Functional DCS	Nos.	196	224	280	359	377
2	Dairy farmers covered through DCS	Nos.	9410	12365	12942	13916	16771
3	Quantity of milk procured from DCS	'000 Ltrs. Per day	29.59	32.53	30.12	29	40.96
4	Milk and milk products sale	'000 Ltrs. Per day	53.29	57.64	57.3	64.73	69.14
5	Villages covered under AI	Nos.	1052	2348	3180	3180	3240
6	Creation of chilling capacity (BMC)	'000 Ltrs.	11	18	22	36	49
7	Sale of cattle feed	'000 kg	29.59	32.53	30.12	28.50	42.20
Financial indicators							
8	Sales turnover	Rs.in crores	94.06	102.18	104.00	123.64	151
9	Funds disbursed	Rs.incrores	5.91	16.56	14.97	16.20	8.59
10	Net profit/loss	Rs.in crores	0.54	1.19	4.50	0.83	2.42

Source: WAMUL office

Method:

The technique of principal component analysis was employed to assess the magnitude of selected indicators that influencing the performance of the milk union in Assam over a period

of five years. In all, ten indicators having a close association with the performance of formal dairy value chain were identified and analysed. For analysis, the selected variables were made scale free by standardizing them as;

$$Y_j = \frac{X_j}{S_j}$$

Where,

Y_j =Standardised value of the j^{th} variable

X_j =Original value of the j^{th} variable

S_j = Standard deviation of the j^{th} variable

Furthermore the year wise weights of these selected indicators computed through method of (Iyengar & Sudarshan, 1982). This index is based on multivariate data and for this particular study where for each unit of production activities are homogeneous i.e. the milk union considering selected physical and financial indicators over different period of time, this weighted index composition method can written as;

$$\bar{Y}_s = W_1 Y_{1s} + W_2 Y_{2s} + \dots + W_n Y_{ns}$$

Where,

$$\bar{Y}_{is} = X_{is} - \text{Min } X_{is} / \text{Max } X_{is} - \text{Min } X_{is}$$

X_{is} = value of i^{th} performance indicator within s^{th} milk union

W_i = arbitrary weights reflecting the relative importance of the individual indicator

Where, $0 < W < 1$

And, $W_1 + W_2 + \dots + W_n = 1$

The overall milk union index $\bar{Y}_s$ varies from zero to one. And a more rational view would be to assume that the weights vary inversely as to the variations in the respective performance indicators, more specifically,

$$W_i = k / \sqrt{\text{var}(Y_i)}$$

A milk union comprising of small and medium sized DCS and the choice of weights in this manner ensures that large variation in any one of the indicators will not unduly dominate the contribution of other indicators.

5. Result and discussions:

The performance dairy cooperatives within a formal dairy value chain is influenced by many variables but the variations are governed by a few underlying dimensions. The identification and assessment of the magnitude of association of these underlying dimensions provide deeper insights in understanding the phenomenon and in formulate appropriate policies.

Table 2: Performance indicators and their weights during 2017-18 to 2021-22

Sl no	Indicators	Weights					Overall average
		2017-18	2018-19	2019-20	2020-21	2021-22	
Physical indicators							
1	Functional DCS	0.0438	0.0410	0.0435	0.0385	0.0412	0.0416
2	Dairy farmers covered through DCS	0.0415	0.0456	0.0467	0.0380	0.0396	0.0422
3	Quantity of milk procured from DCS	0.0524	0.0512	0.0525	0.0485	0.0529	0.0515
4	Milk and milk products sale	0.0526	0.0497	0.0481	0.0466	0.0532	0.0500
5	Villages covered under AI	0.0395	0.0458	0.0444	0.0422	0.0442	0.0432
6	Creation of chilling capacity (BMC)	0.0482	0.0494	0.0396	0.0395	0.0446	0.0442
7	Sale of cattle feed	0.0478	0.0443	0.0448	0.0429	0.0515	0.0462
	Total	0.3258	0.327	0.3196	0.2962	0.2962	0.3272
Financial indicators							
8	Sales turnover	0.0533	0.0458	0.0536	0.0511	0.0550	0.0517
9	Funds disbursed	0.0506	0.0434	0.0476	0.0503	0.0501	0.0484
10	Net profit/loss	0.0511	0.0514	0.0405	0.0391	0.0508	0.0465
	Total	0.0155	0.1406	0.1417	0.1405	0.1559	0.1188

Author's calculation

Year wise weightage as shown in table 2, the physical indicators are playing an important role in the performance of formal dairy value chain as their weightage over the five years being higher than financial indicators. The total weightage assigned to the physical indicators are marginally increasing from 0.325 in 2017=18 to 0.327 in 2021-22 with an overall average of 0.319. On the other hand, the weightage of financial indicators remain almost stable over the period with an average weightage value of 0.146.

The results of principal component analysis (Table 3) revealed the existence of two main underlying dimensions, i.e. physical and financial indicators. The percentage variation among the loading values of physical dimensions, as measured by the coefficient of variation is approximately 29.5 per cent, which indicates moderate variability among the loading values which are not highly uniform and reflecting the diverse contributions of the physical indicators to the first principal component (PC1). Similarly, the percentage variation among loading values of financial dimensions is approximately 40.0 per cent and it indicates relatively high variability among the values. However, the combined percentage variation of these two dimensions together is 69.5 per cent, which provides insight into the overall variability of both dimensions to the first principal component.

Table 3: Results of PCA – loading values of physical and financial indicators

Sl no	Physical indicators	Loading values
1	Functional DCS	0.146
2	Dairy farmers covered through DCS	0.184
3	Quantity of milk procured from DCS	0.295
4	Milk and milk products sale	0.299
5	Villages covered under AI	0.145
6	Creation of chilling capacity (BMC)	0.238
7	Sale of cattle feed	0.214
	Percentage variation explained by first dimension	29.5
	Financial indicators	
	Sales turnover	0.298
	Funds disbursed	0.141
	Net profit/loss	0.177
	Percentage variation explained by second dimension	40.0

Author's calculation

The aggregate variability in the contributions with higher coefficient of variation value indicates greater disparity in their influence, within which the physical indicator has moderate variation of 29.5 per cent in physical indicators but with 40 per cent in financial indicators it shows higher variability. However if comparatively more rigorous approach to compute the coefficient of variation of all loading values of both dimensions together, then the computed coefficient of variation will be 30.6 per cent, i.e. much lower variability than the aggregate percentage variation of 69.5 per cent. Furthermore in order to examine the overall variation, combined value of these two dimensions has been considered.

6. Conclusion:

The important findings from the study indicate that there existed two main underlying dimensions in the performance of formal dairy value chain in Assam, namely financial indicators and physical indicators. Results shows that marginal increase among weightage in physical indicators shows a shift in the priority of the production unit. It can also observed that overall weightage average of quantity of milk procured from DCS, sale of milk and milk products, creation of BMCs as well as sale of cattle feed by the milk union are relatively higher than other financial indicators. Therefore, more attention should be given to these physical and financial indicators by the office-bearers of union level supply chain for strengthening the dairy development programmes on cooperative dairying in the study area.

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