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Traditional Milk Market in Assam: Potential for Income and Employment Generation

Anjani Kumar*, Steven J. Staal, Isabelle Baltenweck† and Lucy L. Lapar†**

I

INTRODUCTION

The integrated food supply chains have emerged as the fastest growing and widely visible market phenomenon. Yet in most developing countries, small scale milk market agents and chains supplying fresh milk and traditionally processing dairy products play a major role. They are the key outlets for small holder dairy producers and are the main source of fresh milk supply for consumers. These traditional small-scale markets account for over 80 per cent of the marketed milk in many countries in South Asia, sub-Saharan Africa and Latin America (Omore *et al.,* 2004). In India too, more than 80 per cent of milk marketed still passes through these traditional milk marketing channels (Steven *et al.,* 2008). The much hyped co-operative dairy development in India has also not been able to significantly affect the dominance of these traditional milk marketing channels. But, the functioning of the traditional milk market and its potential in income and employment generation has not been conceived properly in India. The understanding of the traditional milk marketing and processing chains are helpful in evolving policies and developmental strategies for creating an efficient milk marketing system. A study was planned in one of the backward states of India, namely Assam. In this state, 97 per cent of milk marketing is controlled by traditional milk market agents. (Kumar *et al.*, 2007; Sirohi *et al.,* 2009). The organised marketing and processing of milk in Assam remains insignificant. Formal milk pasteurisation and dairy product processing channels, both under co-operative and private sectors, account for hardly 3 per cent of the total locally marketed milk. The smallholder producers in the state have poor market access. The lack of alternative market options forces them to sell in the traditional market. In this backdrop, this study was undertaken with the objectives of (i) examining the costs and returns in traditional milk marketing and processing, (ii) estimating the milk producer's share in consumer rupee and marketing margins of different actors in the marketing chain, (iii) assessing the potential of traditional milk market in employment generation, and (iv) identifying the factors for scaling up the volume of business of the informal milk market agents in the state.

*Senior Scientist (Agricultural Economics), National Centre for Agricultural Economics and Policy Research, New Delhi - 110 002, **Director, Livestock Marketing Opportunities, International Livestock Research Institute, Nairobi-00100 and †Agricultural Economist, International Livestock Research Institute, Nairobi-00100, respectively.

The paper is organised as follows. Section II presents the data and methodology used in the study. The economics of traditional milk marketing and processing are discussed in Section III. Section IV deliberates on the potential of employment generation in the traditional milk market, while important determinants of the volume of milk handled by the traditional milk market agents have been discussed in Section V. The last section draws the conclusion and policy implications of the study.

II

DATA AND METHODOLOGY

The data were collected from representative random samples of traditional milk market agents in the state of Assam by conducting a survey in nine of its districts, viz., Barpeta, Kamrup, Sonitpur, Nagaon, Morigaon, Jorhat, Tinsukia, Cachar and North Cachar Hills. Eight of these are the target districts of the Assam Agricultural Competitiveness Project (AACP), of which dairy development is a component. One of the districts, viz., North Cachar Hills was added to include a milk marketing system that faces difficult access of hilly terrains. The study on milk agents was conducted at the selected urban/peri-urban centres and rural areas in the identified nine districts. The agents as defined in this study included: (i) unorganised milk vendors, (ii) wholesale milk collectors, and (iii) small milk processors (e.g., for making sweets, chhena, dahi/curd, ghee, etc.). The overall sample size of 590 respondents was determined based on the discussions with the officials of the Dairy Development department of the Government of Assam to provide a representative view of the dairy market in the state. The sample was allocated proportionately on the basis of population in a district. In each district, two administrative blocks, one with a population of less than 10,000 and the other with more than 10,000, were randomly selected; within each block, the main urban centre was identified and two villages from each block were also selected randomly. In the urban and peri-urban centres, the main marketing points for collection, distribution and selling of milk were identified and market agents were randomly selected. In the villages, a complete enumeration was done. Altogether 590 informal milk market agents were surveyed from these districts. These informal milk market agents comprised 355 raw milk traders, 222 milk processors and the remaining 13 engaged in both. The survey was conducted using a pre- structured questionnaire.

To understand the profile of milk marketing in Assam, basic information on the socio-economic profile was collected. Cost and returns in the marketing and processing of milk were computed to examine the profitability of different stakeholders in the traditional milk marketing chains in the state of Assam. The marketing margins for different market functionaries were estimated to assess the distribution of gains across the market chain using Equation (1):

$$MM = Sp - Cp - Mc \qquad \text{....(1)}$$

where, MM is the marketing margin; Sp is the sale price; Cp is the cost price; and Mc is the marketing cost incurred by the trader. The producer's share in consumer rupee (P_s) for different marketing channels was calculated using, Equation (2):

$$P_s = \frac{P_F}{P_C} * 100 \qquad \text{....(2)}$$

where, P_F is the price received by the milk producer and P_c is the price paid by the consumer.

The data was analysed using Ordinary Least Squares method to identify the socio-economic factors affecting the volume of business of the traditional milk market agents. The model estimated was given in Equation 3:

$$\ln Y_1 = \alpha + \beta_1 \ln X_1 + \beta_2 \ln X_2 + \beta_3 \ln X_3 + \beta_4 \ln X_4 + \beta_5 \ln X_5 + \beta_6 \ln X_6 + \beta_7 \ln X_7 + \beta_8 \ln X_8 + \beta_9 \ln X_9 + \beta_{10} \ln X_{10} + \beta_{11} \ln X_{11} + \beta_{12} \ln X_{12} + \beta_{13} \ln X_{13} + \mu_I \qquad \text{....(3)}$$

where,

Y_i is the quantity of milk (in litres) handled by a trader; α is the intercept; β_1 to β_{13} are the parameters to be estimated;

X_1 = Age of trader (years);
X_2 = Education of trader (years of schooling);
X_3 = Initial capital (Rs.);
X_4 = Experience in milk marketing (years);
X_5 = Occupation of trader (Only milk marketing =1, others=0);
X_6 = Participation of family members in business (If yes=1, otherwise=0);
X_7 = Ownership of business (Sole=1, otherwise=0);
X_8 = Type of trader (Raw milk trader=1, otherwise=0);
X_9 = Distance travelled by trader for business (km);
X_{10} = Travel time (minutes);
X_{11} = Location of business (Urban=1, otherwise=0);
X_{12} = Mode of business acquisition (Self-started=1, otherwise=0);
X_{13} = Source of financing (Formal credit=1, otherwise=0);
μ_i the error-term; and
ln = natural logarithm.

III

ECONOMICS OF MILK TRADING, PROCESSING AND MARKETING MARGINS

Socio-Economic Profile of Milk Market Agents

The socio-economic profile of sampled milk market agents is depicted in Table 1. The dominant players in milk marketing were the raw milk traders, followed by the traditional milk processors. A very small proportion of milk market agents were involved in both raw milk marketing and milk processing. The average age of milk market agents was 38 years. On average, they had 8 years of schooling--7 years for raw milk traders and 11 years for milk processors. This suggests that low level of education could be a form of barrier for entry into value-added milk processing activities. Milk marketing was in the domain of menfolk in Assam as amongst 590 milk market agents, only 2 were females.

TABLE 1. DEMOGRAPHIC CHARACTERISTICS AND SCALE OF BUSINESS OF INFORMAL MILK TRADERS IN ASSAM

Characteristics (1)	Raw milk trade (2)	Raw milk trade and processing (3)	Milk products processing (4)	All (5)
Sample size (No.)	355	13	222	590
Average age (years)	37.5	39.5	39.5	38.3
Average education(years)	6.6	10.5	10.7	8.2
Average milk handled per day (litres)	74.9	86.8	51.6	66.4
Participation of other family members (No.)				
Full-time	0.1	1	0.26	0.18
Part-time	0.36	0.31	0.57	0.44
Pattern of business ownership (No.)				
Single proprietorship	352	12	210	574
Private, joint partnership	3	1	12	16
Average experience in the business (years)	11.1	11.3	12.2	11.5
Mode of business acquisition (No.)				
Self-started	312	11	186	509
Inherited	43	2	36	81
Occupational profile (No.)				
Dairy marketing only	196	10	167	373
Dairy marketing and other activities	159	3	55	217
Contribution of dairy trading in household income (No.)				
0-50 per cent	35	0	11	46
50-75 per cent	80	1	35	116
75 per cent and above	240	12	176	428

On an average, a traditional milk market agent handles 66 litres of milk per day, it being 75 litres per day for raw milk traders, 52 litres per day for milk processors and 87 litres per day for market agents engaged in both activities. The disaggregation

of data has revealed that the traditional milk marketing in the state is dominated by small traders, 33 per cent of the respondents handle only 8-30 litres milk per day; 39 per cent handle 31-60 litres milk per day and the remaining 22 per cent handle more than 60 litres of milk per day.

The traditional milk agents apparently operated on an individual basis, although with the help from hired labourers in some cases. The involvement of family members in milk marketing was not significant, 0.2 man-day/milk trader family on a full-time basis and 0.44 man-day/milk trader family on a part-time basis. A majority of milk market agents (97 per cent) operate their business as single proprietors, less the pattern of ownership being the same across these agents.

Milk trading provides off-farm employment to a large number of people in the state, who derive a substantial portion of their household income from milk marketing. Of the 590 milk market agents, 373 (63 per cent) depend fully on milk marketing as the source of their household income. For the remaining 217 agents, the contribution of milk marketing to their household income was significant. The milk market agents have been in the business on an average for about 12 years, which suggest that the enterprise is a long-term engagement. Further, it is interesting to note that a majority of the milk market agents (87 per cent) had started the business themselves, while only 13 per cent had inherited it. The high percentage of self-starters is a reflection of the opportunities for income and employment generation in milk marketing in the state.

Costs and Returns in Milk Marketing

In this analysis, costs and returns were considered separately for raw milk traders and milk processors. Only variable cost was considered for estimating the returns. Thus, the net return, calculated by subtracting the variable cost from the gross return, represents the return to labour and investment by the trader. The variable cost mainly consisted of transaction costs in the purchasing and selling of milk. In particular, the expenditure on the transport in procurement and the sale of milk, and on preservatives, water, electricity, taxes, rents, etc. were considered.

The raw milk traders incurred approximately Rs. 0.64/litre as variable cost and this added about 4 per cent to the expenditure incurred on the procurement of milk (Table 2). Surprisingly, the transaction cost showed an inverse relationship with the volume of business, bigger traders incurring a higher unit cost of Rs 0.82/litre on transaction compared to that by smaller traders (Rs 0.19/litre), which is counter-intuitive. The large traders move longer distances, and incur higher costs on transport. But in spite of higher unit costs, they generate an overall higher returns to labour. The cost on transport accounted for 36 per cent of the total transaction cost (Table 3). The other important items in variable costs were rent and maintenance of business premises and the labour, accounting for 31 per cent and 28 per cent, respectively. The remaining expenditure was incurred on water, electricity, etc.

TABLE 2. AVERAGE COSTS AND RETURNS OF RAW MILK MARKETING

Sr. No. (1)	Particulars (2)	Traders: Small (≤30) (3)	Medium (31- 60) (4)	Large (≥60) (5)	All (6)
1.	Milk handled per day (litres)	23	43	164	78
2.	Total value of milk purchased (Rs./day)	314	589.1	2431.3	1123.9
3.	Total value of consumed and leftover milk (Rs./day)	1.20	2.3	12	5.3
4.	Cost of transport of milk marketing (Rs./day)	0.80	2.2	49.5	17.9
5.	Additional material cost in milk handling (Rs./day)	0	0.20	3.20	1.20
6.	Labour expenditure (Rs./day)	1.20	2.40	37.50	13.90
7.	Rents/maintenance/electric/water etc. (Rs./day)	2.40	2.9	45.1	17.1
8.	Total variable costs (Rs./day)	4.40	7.70	135.30	50
9.	Gross expenditure (Rs./day)	318	596	2566	1173
10.	Gross revenue (Rs./day)	405.2	748.5	3082	1427.7
11.	Net revenue(10-9+3) (Rs./day)	87.9	154	528	259.1
12.	Total variable cost (Rs./litre)	0.19	0.18	0.82	0.64
13.	Net revenue (Rs./litre)	3.8	3.6	3.2	3.3

TABLE 3. DISTRIBUTION OF COSTS ON RAW MILK MARKETING

(per cent)

Sr. No. (1)	Particulars (2)	Traders: Small (≤30) (3)	Medium (31- 60) (4)	Large (≥60) (5)	All (6)
1.	Cost of transport of milk marketing	18.4	28.2	36.6	35.6
2.	Additional material cost in milk handling	0.1	2.9	2.3	2.3
3.	Labour expenditure	27.2	31	27.7	27.9
4.	Other expenditure (Rents/maintenance/electric/water, etc.)	54.5	38	33.3	34.1

On an average, milk traders in the study area earned a profit of Rs. 259/day, which varied with the scale of business. The small traders earned only Rs. 88/ day, which was probably slightly higher than the prevailing wage rate in the state of Assam. Further, getting regular work on the existing wage rate elsewhere is uncertain. The medium categories of milk traders earned Rs. 154/day, which was a modest earning in view of the per capita income in the state. The large traders earned Rs. 527/day, which was by any means a good earning in the study area. However, it is interesting to note that small traders could fetch a higher return per unit of milk marketed, but are because of the small scale of their business, their total income from milk marketing was meagre. Scaling-up of their business would be helpful in improving their income level, but the constraints in scaling-up of their businesses need an in-depth analysis.

Economics of Milk Processing and Value Addition Margins

In India, only about 38 per cent of milk produced is estimated to be processed. The organised milk sector processes (large-scale dairy processing plants) about 13 million tonnes (14 per cent), while the unorganised sector (halwais, milk vendors,

shopkeepers, etc.) processes 22 million tonnes (24 per cent) milk annually (Dairy India, 2007). Thus, the informal milk market agents process about 63 per cent of the total milk processed in the country. In the absence of large formal sector dairy plants in the state of Assam, a considerably higher proportion of milk is processed by informal sector (Kumar *et al.,* 2007). Different types of milk products processed by the informal milk market agents in the state of Assam are: sweets, curd, cream and paneer. These are produced in large amounts in almost all the districts of the state (Table 4). However, the volume and frequency of milk processing depend on their market demand. If the demand becomes high, then processing is done once or even twice a day. For the modest demand, it is done every alternate day or once a week.

TABLE 4. QUANTITY OF MILK PROCESSED BY PRODUCT TYPE

Sr. No. (1)	Product (2)	Quantity of milk processed (average/day/processor) Litres (3)	Percentage (4)
1.	Fermented cultured milk	0.14	0.23
2.	Ghee	0.40	0.67
3.	Cream	8.82	14.78
4.	Yoghurt	5.09	8.53
5.	Paneer	5.47	9.17
6.	Chenna	3.29	5.51
7.	Sweets	36.25	60.74
8.	Others	0.22	0.37
	Total	59.69	100.00

It was found that on an average, 60 litres of milk was being processed per day by a milk processor. Most of the milk (61 per cent) was used for preparing sweets, followed by cream (15 per cent). About 9.2 per cent of the milk was converted into paneer and 8.5 per cent into yoghurt. About 5.5 per cent of milk was converted into chhena. The rest of the milk was used for the preparation of ghee and fermented culture milk. The use of a lower percentage of milk for preparing ghee and fermented culture milk may be attributed to the prevalent custom of preparing these products in the household and avoiding their buying from the market.

While calculating gross income, the total value of different processed products was taken into account. On the cost side, apart from the cost of milk, expenditure on labour, the added material, fuel, electricity, etc., were taken into consideration. On an average, the traditional milk processor earns a net return of Rs. 15 per litre from milk processing. In a similar study, the value-addition margins have been reported to be Rs. 1.38 to Rs. 10.50 per litre of milk in another Indian state, Orissa, depending on the marketing channels and level of processing (Saha *et al.,* 2004). These value-added products are generally sold in unbranded form in the local market, and are accepted on processors' credibility and reputation in the market. The costs and returns, as depicted in Table 5 indicate that milk processing offers good opportunities for enhancement of income. However, milk processing seems to be scale efficient, as

returns per unit increase with the volume of business, which was not observed in the marketing of raw milk. This may be partly attributed to the non-divisibility of some of the fixed resources and efficient utilisation of time and labour in bigger units.

TABLE 5. COSTS AND RETURNS TO MILK PROCESSING AND VALUE ADDITION

(Rs./day)

Sr. No. (1)	Particulars (2)	Small (≤30) (3)	Medium (31- 60) (4)	Large (≥60) (5)	All (6)
1.	Total value of milk purchased	360.7	679.8	1490.3	786.6
2.	Total value of consumed and leftover milk	1.0	12.8	16.9	9.3
3.	Cost of transport in milk marketing	0.7	0.3	2.6	1.0
4.	Additional material cost in milk processing (Rs.)	172.6	247.0	339.3	244.4
5.	Labour expenditure	75.4	103.8	154.9	107.4
6.	Rents/maintenance/electric/water etc.	71.9	77.1	129.2	89.9
7.	Total cost of milk processing and handling (Rs.)	321.5	440.7	643.0	452.0
8.	Gross expenditure	681.2	1107.6	2116.5	1229.3
9.	Gross revenue	959.4	1710.9	3681.6	1980.3
10.	Net revenue (9-8+2)	279.2	616.1	1582	760.3
11.	Net revenue /litre	12.40	13.80	16.00	14.80

The small milk processors spent about 47 per cent of their gross expenditure on the handling and processing of milk, while medium and large processors spent about 40 per cent and 30 per cent respectively (Table 6).

TABLE 6. DISTRIBUTION OF COSTS OF PREPARATION OF PROCESSED MILK PRODUCT

(per cent)

Sr. No. (1)	Particulars (2)	Small (3)	Medium (4)	Large (5)	All (6)
1.	Cost of milk	52.9	61.4	70.4	64.0
2.	Cost of transport	0.1	0.8	0.1	0.1
3.	Cost of additional material in milk processing	25.3	22.3	16.0	19.9
4.	Labour expenditure	11.1	9.4	7.3	8.7
5.	Other expenditure (rents/maintenance/electric/water etc.)	10.6	7.0	6.1	7.3

Producer's Share in Consumer Price

Milk marketing system in Assam is fairly complex. A number of different marketing agents interact at various levels in carrying milk from producers to consumers. The producer's share in consumer's rupee is an assessment of the relative bargaining position in the market. It also reflects producers' access and integration with the market. Thus, the analysis of the producer's share in consumer's rupee across different marketing channels was carried out and presented in Table 7. A perusal of the Table reveals that the producer's share in consumer's rupee varied from 68 per cent to 84 per cent, depending upon the marketing channel. The producers got a higher share when they sold directly to the wholesalers or processors. It implies that the producers' integration with milk market agents, who operated at a higher level of the marketing/supply chains, ensured a higher share in the consumer's

rupee to the producer. The producers got the lowest share as well as lowest absolute amount when they sold to the co-operatives. A lower per unit value realisation coupled with delayed payments by the co-operatives make it unattractive for the producers to sell milk to them, especially when alternative market outlets are available. The producer's share in the consumer's price of milk in different parts of the country has been reported to be 50 per cent to 98 per cent (CALPI, 2006).

TABLE 7. PRODUCER'S SHARE IN CONSUMER'S RUPEE IN DIFFERENT MARKETING CHANNELS

Channels	Purchase price for market agents at various levels (Rs./litre)			Consumers' price (Rs./litre)	Producers' share in consumer's rupee (per cent)
	I	II	III		
(1)	(2)	(3)	(4)	(5)	(6)
Producer-Vendor-Wholesaler-	14.0	16.5	-	18.0	77.8
Producer-Vendor-Cooperatives-Wholesaler-Consumer	14.0	15.0	17.0	18.0	77.8
Producer-Wholesaler-Retailer-	15.0	17.0	-	17.8	84.3
Producer-Cooperative-Wholesaler-Retailer-Consumer	12.1	17.0	17.8	18.4	68.0
Producer-Wholesaler-Consumer	15.0			17.9	83.8
Producer-Halwai (Sweetshop)-	15.0			19.0	78.9

Marketing Margins for Different Functionaries in the Market Chain

The gross marketing margin at the aggregate level does not reveal the distribution of gains to different functionaries of the marketing chains. In fact, the relative size of gross margins of various market participants can indicate wherein the marketing chain value addition has been done and/or profits are made. Therefore, marketing margins were also computed across different types of business establishments and is given in Table 8. Among raw milk traders, wholesalers received maximum profit (Rs. 3.73/litre), followed by the milk vendors (Rs. 3.21/litre). Among milk processors, per unit profit was observed to be the highest for the milk bar (Rs.17.33/litre) followed by the retailers (Rs. 16.75/litre).

TABLE 8. MARKETING MARGINS OF DIFFERENT TYPES OF TRADERS IN MILK MARKETING

Milk marketing traders	Cost of milk (Rs./litre)	Total marketing cost (Rs./litre)	Price Received (Rs./litre)	Marketing margin (Rs./litre)	Avg. milk purchase (litre/day)	Net return/ trader (Rs./day)
(1)	(2)	(3)	(4)	(5)	(6)	(7)
			Raw milk trade			
Milk-vendors	14.16	0.34	17.71	3.21	59.7	192
Wholesaler	14.96	1.33	20.02	3.73	242.2	903
Milk bar	14.09	0.69	17.30	2.52	95.3	240
All	14.38	0.64	18.34	3.31	78.1	259
			Milk product processing			
Wholesaler	15.00	1.09	22.70	6.61	67.3	445
Retailer	15.32	3.94	36.02	16.75	37.5	628
Milk bar	14.48	3.61	35.41	17.33	49.3	854
Sweet shop	15.31	9.15	39.21	14.75	52.3	771
All	15.28	8.60	38.66	14.77	51.5	760

IV

EMPLOYMENT GENERATION IN INFORMAL MILK MARKET

Assam accounts for about 0.7 per cent of the total workforce engaged in the livestock sector in India (NSSO, 2004-05). The employment in this sector includes the rearing of animals, marketing and processing of different livestock produce, animal husbandry services, etc. Apart from direct employment, the sector generates indirect employment also. Of the total employment in the livestock sector, dairy accounts for the maximum share. Marketing and processing of milk is one of the important components of employment in the dairy sector and accounts for about 10 per cent of the workforce engaged in the dairy sector. The employment in milk marketing and processing was estimated to find out the employment potential of the traditional milk marketing sector in the state of Assam. The data on labour-use in raw milk marketing and processing were used from this survey and data on marketed surplus was taken from producers' surveys conducted by the International Livestock Research Institute, Nairobi. Information generated from the surveys in the selected districts was extrapolated for the state as a whole.

The employment generation in the informal milk markets has been found to be quite significant. For every 1000 litres of milk marketed on a daily basis, 19.5 milk vendors (dudhias) get employment; these vendors on an average handle some 66 kg of milk per day. All these jobs are created in the form of self-employment (Table 9). For milk processing and value-addition, employment for 57.8 man-days is created for 1000 litres of milk in the traditional milk processing. Extrapolation of these figures to the state level, assuming similar employment levels across the state provided an idea about the level of employment generation through such small-scale traditional milk markets. The potential for creating jobs in milk marketing and handling would increase with the increase in the marketable surplus of milk in Assam.

TABLE 9. EMPLOYMENT GENERATION IN INFORMAL MILK MARKETS IN ASSAM, INDIA

Informal milk markets (1)	Employment rate (jobs per 1000/milk) assuming 8 working hours/day (2)	Proportion of marketed milk that is handled by type of agent (using entire Indian data) (3)	Estimated quantity of milk handled by type of agent ('000 litre/annum) (4)	Estimated total number of jobs generated in Assam (5)	Percentage of the total number of jobs (6)
Milk vendors or raw milk traders (dudhias)	19.5	0.85	348267	18634	65
Halwais (sweet shops) or milk processors	57.8	0.15	62231	9847	35
Total	31.8	1.0	410498	28481	100

The volume of milk marketed by the traditional sector in the state could translate into the estimated daily employment of 28481 man-days, with raw milk traders

accounting for 65 per cent and milk processors accounting for 35 per cent of the total milk market employment. It does not include the persons employed in the formal milk processing sub-sector. The employment created in the traditional milk marketing amounts to some 17 per cent of the estimated total direct employment of 0.17 million in the livestock sector in the state. The estimates based on NSSO database (2004-05) indicated employment of 29975 persons in the processing and marketing of milk and milk products at the state level. Both the estimates have reaffirmed the significant opportunities that small-scale and traditional milk market activities present in the state.

Thus, the informal milk marketing and small-scale dairy industry generate significant employment at each stage, from production through procurement, transportation, processing and marketing of milk, much of which is available to even non-skilled individuals who may have limited employment opportunities in other sectors. Compared to the organised milk markets, which employ fewer labourers per unit of milk marketing and processing, the traditional milk market comprised labour-intensive enterprises with enormous potential for employment generation in the rural sector.

V

DETERMINANTS FOR VOLUME OF MILK HANDLED BY INFORMAL MILK MARKET AGENTS

The OLS regression analysis was conducted to identify the factors which determine the volume of business of the traditional milk market agents. The variables like education, capital, occupation, participation of family members in the business, ownership pattern, activity, distance and travel time to market, mode of business acquisition, and source of financing turned to be important and affected the quantum of milk handled by the milk market agents (Table 10). The level of education had a direct and significant relationship with the volume of milk business. Thus, the low level of education of the market agents seems to act as a barrier for scaling-up the business. The financial capacity of a milk market agent also determined the level of business. The milk market agents who depended solely on milk marketing trading for their livelihood tended to have a higher level of business. Association with a single occupation seemed to have brought in more expertise and enhanced skill to increase the level of business. Distance and travel time to market also determined the level of business positively. The milk market agents who travelled longer distances and had to spend more time on travel were inclined to handling higher volumes of milk. The trading in partnership mode could augment handling of a higher volume of milk. The mode of business acquisition was also found to influence the scale of business significantly. If the business was inherited, the volume handled was higher in comparison to the self-started business because business established for a long time is likely to have a higher volume. The involvement of family members influenced the

scale of the business positively as it increased the availability of labour as well as ensured its timely availability.

TABLE 10. FACTORS INFLUENCING VOLUME OF MILK HANDLING BY TRADERS

Explanatory variables (1)	Coefficient (2)	Standard error (3)
Age of the trader (years)	0.0435	0.5574
Education (years of schooling)	5.1973***	1.3815
Initial capital (Rs.)	0.0008***	0.0001
Experience in milk trading (years)	0.9984	0.7447
Occupation		
Only milk trading=1, others=0	20.0904*	10.7056
Participation of family members in the business		
If yes=1, otherwise=0	20.8076**	10.4949
Ownership of business		
Sole=1, otherwise=0	-88.9308**	29.8700
Activity		
Raw milk trade=1, otherwise=0	38.7795*	13.9581
Distance travelled (km)	1.3049**	0.6221
Travel time (minutes)	0.2868**	0.1361
Urban=1, otherwise=0	-14.1313	14.7004
Mode of business acquisition		
Self-started =1, otherwise=0	-27.0252**	13.9721
Source of financing		
Formal credit=1, otherwise=0	34.5059*	19.7552
Constant	38.2482	46.3048
Number of observations	584	
R^2	0.2062	
F-value (degree of freedom 570)	11.39	

Note: ***, ** and * indicate significance at 1, 5 and 10 per cent level, respectively.

VI

CONCLUSION AND POLICY IMPLICATIONS

The study has revealed that most of the informal milk market agents in the state of Assam are small traders and derive substantial portion of their household income from it. The scale of their business continues to be low, though the returns from the milk marketing seem to be comparable with or higher than the prevailing wages for an unskilled worker. Thus, milk marketing (fresh or processed) provides more lucrative returns. Majority of the milk marketing agents established their business themselves. The net returns from milk processing and value-addition were significantly higher than fresh milk marketing. However, the value-addition to milk being capital intensive is often beyond the reach of the resource poor small milk market agents indicating the need for increasing access to formal micro or small-scale credit through appropriate policy formulation of the financial institutions. In raw milk marketing, small traders are more efficient, while processing and value-addition favour bigger units. The traditional milk and milk products marketing agents in the state of Assam being the key link between local milk producers and consumers, dairy

development policies should take into cognizance the needs of small-scale traditional milk marketing agents. With increasing awareness among consumers regarding quality and safety of milk and its products, efforts should be made to evolve some sort of licensing, regularisation and legal control to link traditional milk market agents with formal market agents without disturbing their enterprise in the state. It would help maintain the quality and safety of milk and milk products.

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