

Study on procurement pattern and factors affecting milk procurement in Nainital District of Uttarakhand

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Abstract

Objective: This study investigated procurement pattern and main factors affecting fluid milk in Nainital district of Uttarakhand.

Statistical/analysis: Secondary data were collected from selected co-operative dairy plant for procurement pattern and factors affecting milk procurement for the period 2003 to 2013 and 2008-2013, respectively. The main determinants of factors affecting fluid milk have been identified. The average procurement indices in lean season, mean season and flush season were constructed.

Findings: The results indicated that procurement pattern has an increasing trend in the monthly procurement of milk. The milk procurement was at peak in March and lowest in June (summer). It has been found that procurement of milk was usually low in lean season thereafter rising progressively in mean season followed by flush season. On the basis of regression analysis, the study has been found that all the explanatory variables were statistically significant except average value of incentives provided on technical inputs and average kilometers distance travelled per litre of milk procured.

Improvements: The study has observed that seasonality affects the level of milk procurement.

Keywords: Procurement pattern, Factors affecting, Fluid milk, Uttarakhand

1. Introduction

The milk production in India serves three main user groups viz., household sector, unorganized sector and organized sector. The household sector requires milk mainly for the purpose of drinking and secondly for conversion into milk products such as curd, buttermilk, lassi, ghee for family use. The unorganized sector handles urban liquid milk marketing and production of sweets and other traditional products and the organized sector i.e. co-operatives, process milk into pasteurized liquid milk and largely western milk products (milk powder etc). With the growth of population and change in patterns of life with increasing urbanization, there has been a rapid increase in demand for milk and its products particularly in urban areas where these items cannot be, and are not being, produced in sufficiently large quantities.

In India, dairy plants have different systems of milk procurement, namely through private plants, milk vendors, contractors and cooperatives [1]. One of the basic rules of procurement is that in the end, it is important to think in terms of the total cost of the process and products [2]. This includes not only the purchase price, but also time and resources that are expended in the pursuit of commodities.

Many procurement activities suffer from neglect, lack of direction, poor co-ordination, lack of open competition and transparency, price per litre of milk, incentive provided on technical input, number of members, not having a cadre of trained and qualified procurement specialists [3], who are competent to conduct and manage such procurements, in a professional, timely and cost effective manner, all of which influence the procurement process negatively.

Seasonal fluctuation in milk procurement is another important aspect which needs adequate attention to ensure regular and sufficient milk supply throughout the year [4]. Thus considering the facts, an attempt was made to examine the procurement pattern and factors affecting the level of milk procurement.

2. Organizational culture

The structure of organized sector of milk in Uttarakhand state is quite facile. Within the organized sector, the co-operative sector is by far largest in terms of volume of milk handled. The milk is predominantly procured, processed and marketed by co-operative societies which have a three-tier organizational structure, including village level primary milk producers' co-operative societies, district level milk producers' co-operative unions (Dugdh Utpadak Sahkari Sangh) and state level milk producers' co-operative federation i.e. Uttarakhand co-operative Dairy Federation [3]. The average daily milk procurement of the co-operative dairy plants in Uttarakhand is around 1, 16,742 litres.

In Uttarakhand the average daily procurement of milk in organized sector was highest in Nainital district. Therefore, the present study was conducted in organized sector of milk in Nainital district of Uttarakhand. In Nainital district there was only one co-operative dairy plant i.e. Nainital Dugdh Utpadak Sahakari Sangh Ltd, (NDUSS) Lalkuan. Therefore the proposed study was pertaining to Nainital Dugdh Utpadak Sahakari Sangh Ltd, Lalkuan.

In NDUSS Ltd. there were three distinct seasons in a year as follows:

1. Lean season- May, June, July and August.
2. Mean season- March, April, September and October.
3. Flush season- November, December, January and February

3. Methodology

The data were collected based on the records maintained in the office of the plant and by congregating some oral information. For this purpose a number of visits to the office of the plant were made and discussions with general manager, factory manager and other responsible persons in the plant were arranged. The secondary data for procurement pattern and influence of various factors on the level of milk procurement were collected from procurement section of the plant for the period of ten years (i.e. from 2003 to 2013) and five years (i.e. from 2008-2013), respectively.

1. Procurement pattern and factors affecting the level of milk procurement

Procurement pattern and factors affecting the level of milk procurement has been discussed in following sub-sections.

2. Procurement pattern of milk

The procurement pattern of milk has been studied in two ways. In first phase, the data on milk procurement was collected on monthly basis for 10 years i.e. from 2003-2013 and then trend in milk procurement was estimated.

For that purpose, trend equation of the following form was fitted to capture trend in milk procurement over time.

$$Y = a + b t + U$$

Where,

Y = Quantity of milk procured per month (litres)

a = intercept

b = slope coefficient

t = time = 1, 2... 120

U = error term

In second phase, seasonal procurement indices were constructed using ratio-to-moving average method [5]. Seasonal indices (S.I) were constructed using following formula:

$$SI = \frac{\text{Average}}{\text{Overall average}} \times 100$$

3. Factors affecting the level of milk procurement

To examine the influence of various factors on the level of milk procurement multiple regression analysis was done. Four explanatory variables viz., average number of members per milk producer's co-operative societies per month (X_1), average price per litre of milk per month paid to milk producers (X_2), average value of subsidies / incentives provided on the technical input per month (X_3), average km. per litre of milk procured (X_4) and two seasonal dummies (D_1 and D_2) were included in the model for examining their impact on the quantity of milk procured (Y) per month. The specification of milk procurement function used in the present study was as follows:

$$Y = f(X_1, X_2, X_3, X_4, D_1, D_2)$$

Where,

Y = Qty of milk procured per month (litres).

X_1 = Avg. number of members per milk producers co-operative societies per month (No.)

X_2 = Avg. price per litre of milk per month paid to milk producers (₹).

X_3 = Avg. value of subsidies / incentives provided on the technical input per month (₹).

X_4 = Avg. distance (km.) per litre of milk procured (Km).

Two seasonal dummy variables were introduced as under to know the effect of season on the level of milk procurement:

D_1 = 1, if lean season, 0 otherwise

D_2 = 1, if flush season, 0 otherwise

Following functional form of the model was specified and ordinary least squares technique was employed to estimate the parameters of the model.

$$Y = a + b_1 X_1 + b_2 X_2 + b_3 X_3 + b_4 X_4 + b_5 D_1 + b_6 D_2 + U$$

Before undertaking regression analysis, the presence of multicollinearity among explanatory variables was examined. The estimated parameters were tested for their statistical significance using 't' statistic [6].

4. Results and Discussion

Procurement pattern of milk has been studied in two ways. By using time series data trend in milk procurement was estimated and also for knowing the effect of seasonal fluctuation in milk procurement seasonal indices were constructed.

1. Procurement pattern of milk

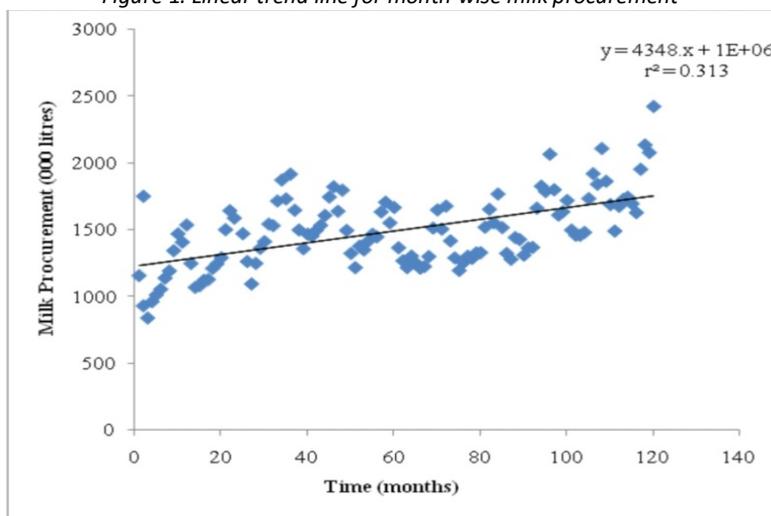
Trend means a pattern of gradual change in a condition, output, or process, or an average or general tendency of a series of data points to move in a certain direction over time, represented by a line or curve on a graph.

Trend in milk procurement was calculated for monthly observations on milk procurement for ten years period i.e. from 2003 to 2013 employing OLS method.

The simple linear trend equation was fitted taking milk procurement (Y) as dependent variable and time (T) as independent variable.

The estimated trend equation of milk procurement has been illustrated graphically in Figure 1. Results indicated that the trend coefficient was significant for month-wise milk procurement. The analysis of procurement pattern revealed an increasing trend in the monthly procurement of milk. The trend equation shows that the quantity of milk procurement increased on an average at a rate of 4348.33 litres per month during the period from 2003-2013 [7].

Figure 1. Linear trend line for month-wise milk procurement



2. Seasonal variation in procurement of milk

The procurement of milk has seasonal fluctuations which directly affect the processing and distribution of milk [8,9]. Hence, to capture the seasonality seasonal procurement indices were constructed using monthly milk procurement data for ten years period i.e. from 2003 to 2013. Table 1 gives seasonal procurement indices of milk.

A close look at the clearly reveals the seasonality in a procurement of milk by dairy co-operatives as procurement indices were above average (100) from December to April and below average (100) from May to November. The finding seems to be in tune with the fact that milk production on Indian dairy farms is normally observed higher in winter season as compared to the summer season as animals can convert feed into milk at a faster rate in winters than that of summers [10]. A perusal of table further reveals that milk procurement was at peak (121.68) in March and lowest (84.85) in June (summer) thereby indicating the effect of climate on milk procurement.

For better understanding of procurement pattern of milk, the procurement period of 12 months can be broken down into 3 seasons, viz., lean season (May, Jun, Jul and Aug), mean season (Mar, April, Sep and Oct) and flush season (Nov, Dec, Jan and Feb). The average procurement indices in lean season, mean season and flush season were worked out to be 89.82, 102.33 and 107.85, respectively. This implied that procurement of milk was usually low in lean season thereafter rising progressively in mean season followed by flush season. In the light of above discussion it can be concluded that climate factors exert influence on procurement of milk by dairy co-operatives.

Table 1. Seasonal procurement indices of milk

S. No.	Month	Seasonal procurement indices
1	April	102.45
2	May	90.95
3	June	84.85
4	July	92.13
5	August	91.35
6	September	91.53
7	October	93.65
8	November	95.73
9	December	109.19
10	January	117.30
11	February	109.17
12	March	121.68

3. Factors affecting the level of milk procurement

In order to know the influence of various factors on the level of milk procurement a regression analysis was performed in which level of milk procurement (lit) was regressed on such explanatory variables as average number of members per society (No.), average price (₹/lit), average value of subsidies/incentives on technical inputs (₹.), average distance travelled (km) and seasonal dummies are set out in Table 2.

A close perusal of the table revealed that the coefficient of multiple determinations (R^2) was 0.78, which indicated that 78% of total variation in the level of milk procurement was explained by the explanatory variables included in the regression function.

It may be observed from the table that the regression coefficient of the average number of members per society (X_1) was positive and statistically significant, which indicated that the quantity of milk procurement increased on an average by 732 litres per month as number of members per society increases.

Average price per litre of milk was found to be another determining factor in the level of milk procurement. The regression coefficient of average price per litre (X_2) was found to be positive and statistically significant. This indicated that increase in price of milk could boost up level of milk procurement.

The regression coefficient of average value of subsidies/incentives provided on technical inputs (X_3) was found to be statistically non-significant which implied non-significant impact of these inputs on the level of milk procurement. Average kilometers distance travelled per litre of milk procured (X_4) shows a non-significant relationship indicating their non-significant impact on the level of milk procurement.

The seasonal dummy variables (D_1 , D_2) were used to examine the effect of a particular season on the level of milk procurement. The regression coefficient of seasonal dummy variable (D_2) for flush season in the milk procurement function was found to be positive and statistically significant indicating that the milk procurement in flush season was significantly different from mean season.

Whereas, regression coefficient of seasonal dummy variable (D_1) for lean season in the milk procurement function was found to be negative and statistically significant indicating that the milk procurement in lean season was lower by about 1474 litres as compared with the base category (which was mean season) [11,12].

Table 2. Estimated parameters of milk procurement function

Variables	Regression coefficients	Standard error
(Constant)	44981.43**	17316.47
Avg. no. of members (X_1)	732.00*	209.84
Avg. price (X_2)	36.75*	4.35
Avg. value of subsidies (X_3)	1.03	0.52
Avg. km. (X_4)	25.73	18.25
D_1 (lean)	-1473.89**	59.43
D_2 (flush)	30291.96*	4205.42
R^2	0.78	

*Significant at 1% level of probability, **Significant at 5% level of probability

5. Conclusions and Policy implications

Based on the insights provided by the study, the following conclusions and policy implications have been suggested to make the NDUSS, Ltd, Lalkuan more efficient at procurement level.

As procurement was quite low particularly during the period from May to Nov, thus co-operative dairy plant should make concerted effort to increase the level of milk procurement.

In this context, imparting training to farmer-members at primary level regarding benefits of co-operative marketing may help increasing the milk procurement in the area.

As a result procurement will increase and consequently processing and distribution of milk will get improved.

As average membership per society had direct and positive influence on the level of milk procurement, therefore, effort should be taken up to enhance the enrollment of members in dairy co-operatives for increasing milk procurement.

In this regard, awareness programmes should be designed and dairy farmers should be motivated to join the dairy co-operatives, for assured market will help dairy farmers managing marketing risk on output side in order to maintain long term profitability.

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