

Seasonal availability and utilization pattern of fluid milk in Nainital district of Uttarakhand

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Abstract

Objective: An attempt was made to study seasonal availability and utilization pattern of fluid milk in Nainital district of Uttarakhand.

Statistical analysis: The study was based on the primary data collected for liquid/processed milk varieties and milk products from the selected co-operative dairy plant of Nainital district. The pattern of utilization of milk in the manufacturing of product mix percentage was computed for various products after making an adjustment of loss of milk in transit, handling etc.

Findings: Three distinct seasons in a year were observed. It has been found that there were three sources of milk to plant viz., primary co-operative societies, the State Milk Grid and the milk reconstituted at the plant from powder milk. Standardized milk and dahi was the major product for the plant. The study has observed that out of the total availability of milk more than 80 percent of milk was used for processed milk varieties and rest will be used for making different milk products. The study concluded that production was affected by calving season and weather condition. Further, there was no definite pattern observed in the production of milk and milk products. Its production mainly depends upon the local demand for dairy products.

Improvements: The study has suggested that development of co-operative dairy industry in a sustainable manner, the co-operative dairy plants should formulate long-term vision and strategy.

Keywords: Seasonal Availability, Utilization Pattern, Milk, and Milk Products, Uttarakhand.

1. Introduction

Dairying has been inherent and non-separable in Indian culture, for centuries. In the vast field of animal husbandry, the contribution of dairying has been most significant in terms of employment as well as income generation. In India, dairy plants have different systems of milk procurement, namely through private plants, milk vendors, contractors and cooperatives [1]. The organized sector comprises of mainly co-operatives and few private fully mechanized dairy plants. In the organized sector, there are over 1000 dairy plants in the cooperative, public and private sectors, registered with the government of India and the state governments. The Uttarakhand 27th state of India came into existence on 9th Nov. 2000. Before slicing of Uttarakhand from Uttar Pradesh (UP), the dairy co-operative was under the trade name of 'Parag'. After formation of Uttarakhand, there was the emergence of functional co-operative society "Uttarakhand Cooperative Dairy Federation Ltd." trade named 'Aanchal' for milk procurement, processing, and marketing. In Uttarakhand, the annual milk production is about 1,383 thousand tones. The average daily milk procurement of the co-operative dairy plants in Uttarakhand is around 1, 16,742 liters.

In Uttarakhand, the organized sector of milk comprises of only co-operatives. Uttarakhand is generally characterized by the small milk producers having one to two milch animals (comprising cows and buffaloes) backed by poor production technology and unorganized milk producers. The primary milk producers are not capable of investing money individually and are not in a position to control the prices of their product and do not get a proper return for their work. Dairy development helps the rural poor in having additional regular income and organized milk procurement help the producers to produce more milk [2]. Seasonal fluctuation in milk procurement is another important aspect which needs adequate attention to ensure regular and sufficient milk supply throughout the year.

Utilization has been incorporated in dairy policies and programs, most notably marketing orders where it has implications for pricing and appears to have had some industry structure ramifications [3]. Thus considering the facts, an attempt was made to examine seasonal availability and pattern of utilization of milk in the manufacturing of product mix.

2. Methodology

Nainital district of Uttarakhand was selected purposively due to highest milk procurement from its member's society. In Nainital district, the organized sector of milk comprised of only co-operatives and no other unit / firm was engaged in milk marketing. In Nainital district, there was only one co-operative dairy plant i.e. Nainital Dugdh Utpadak Sahakari Sangh Ltd, (NDUSS) Lalkuan. The study pertained to one complete fiscal year of the dairy plant i.e., from April 1, 2012, to March 31, 2013. The data were collected based on the records maintained in the office of the plant and by congregating some oral information. In NDUSS, Ltd the milk was collected through 461 milk co-operative societies/collection centers on 25 milk routes and 5 chilling centers. The average daily milk procurement for the dairy plant amounted to 58,000 liters per day. On an average, the plant processed 50,000-52,000 liters per day of milk.

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

To examine the seasonal pattern of milk availability and pattern of utilization of milk in the manufacturing of product mix percentage was computed for various products after making an adjustment of loss of milk in transit, handling etc. Following estimates were obtained to attain the objective:

1. Seasonal pattern of milk availability

Seasonal pattern of milk availability has been studied in two ways. In first phase, month-wise data on quantity of milk procured from primary co-operative societies, state milk grid and milk reconstituted at the plant, if any were estimated. Then find out the total availability of milk by summing up the estimates. In second phase, seasonal (month-wise) indices of milk availability at the plant were constructed using the following formula:

$$I_i = \{M_i/M\} \times 100$$

Where,

I_i = Index value for i^{th} month.

M_i = Quantity of milk available in i^{th} month.

M = Average monthly availability of milk during the year.

2. Seasonal production pattern of milk and milk products

For that purpose, month-wise data on quantity of milk and milk product produced at the plant (product-wise) and month-wise quantity of milk used for different products were estimated [4]. Similarly percentages of total quantity of milk used in the production of various products (month-wise as well as for annual average) and percentage of loss of milk were calculated. Seasonal (month-wise) production indices of milk and milk products produced were constructed using following formula:

$$I_{ij} = \{P_{ij}/P_j\} \times 100$$

Where,

I_{ij} = Index value of j^{th} product for i^{th} month.

P_{ij} = Quantity of j^{th} product produced in i^{th} month.

P_j = Average monthly production of j^{th} product.

Per cent utilization of plant capacity was calculated using the following formula:

$$C_i = \{X_i/50,000 \times D_i\} \times 100$$

Where,

C_i = Per cent average utilization of capacity in i^{th} month.

X_i = Total quantity of milk handled in i^{th} month.

D_i = Number of days in i^{th} month.

(Note: The installed capacity of the plant is to handle 50,000 liters of milk)

3. Results and discussion

1. Seasonal pattern of milk availability

To make various products, the cooperative dairy plant at Lalkuan has been procuring milk from its member cooperative societies and State Milk Grid (SMG). It also reconstituted milk at the plant from the powder milk. The main source, however, was primary cooperative societies. Table 1 reveals that the total availability of milk at the plant was recorded as high as 31933763 liters. The primary cooperative societies contributed 69.09 percent (22061804 liters) in the total availability of milk at the plant. The contribution of SMG came out to be 29.56 percent (9439984 liters) and that of the milk reconstituted at the plant from powder as 1.35 percent (431975 liters) to the total availability of milk for making various products. It may be seen from the table that procurement of milk from primary societies was lowest in the month of June (1487880 liters). Thereafter, it went on increasing (except during Oct-Nov) and reached a peak in the month of March (2418558 liters). As the production was affected by calving season and weather condition, production was found to be generally lower during the rainy season and higher during the late winter season which generally coincides with the calving period. Calving period in case of buffaloes is generally found during the months of July, August, and September and in case of cows from January to February.

Table 1. Seasonal pattern of milk availability at NDUSS

Year / Month	Milk procured from society members		Milk procured from SMG		Milk reconstituted		Total		
	In litres	Index no.	In litres	Index no.	In litres	Index no.	In litres	Index no.	
2012	April	1859430	101.14	747922	95.07	29000	80.56	2636352	99.07
	May	1685501	91.68	998012	126.87	21200	58.89	2704713	101.64
	June	1487880	80.93	1138029	144.66	67125	186.47	2693034	101.20
	July	1672760	90.99	886490	112.69	38225	106.19	2597475	97.61
	Aug	1724809	93.82	779491	99.09	15575	43.27	2519875	94.69
	Sep	1741200	94.71	519508	66.04	48225	133.97	2308933	86.76
	Oct	1691639	92.01	815815	103.71	46650	129.59	2554104	95.98
	Nov	1625310	88.40	684194	86.97	134475	373.56	2443979	91.84
	Dec	1949621	106.05	719003	91.40	4450	12.36	2673074	100.45
2013	Jan	2130940	115.91	699727	88.95	13600	37.78	2844267	106.88
	Feb	2074156	112.82	689097	87.60	--	--	2763253	103.84
	Mar	2418558	131.55	762696	96.95	13450	37.36	3194704	120.05
	Total	2206180 (69.09)		9439984 (29.56)		431975 (1.35)		31933763 (100.00)	
	Average	1838483.67	100	786665	100	35998	100	2661146.92	100

Note: Figures given in parentheses show percentages to the total

It may also be noted from the table that milk procured from SMG was highest in the month of June (1138029 liters) when the quantity of milk procured from societies was lowest. Similarly, it can be seen from the table that in general milk procured from SMG was lower when the milk procured from the societies was higher. The practice seemed to be obvious because milk plant had to depend on sources other than its own societies to

meet the year-round demand for milk. Further, the quantity of milk reconstituted at the plant was highest in the month of November (Table 1). The quantity of reconstituted milk depends on the amount of milk procured from member-societies and SMG. If the procured quantity of milk was lower, more milk was required to be reconstituted at the plant to supplement the supply of standardized milk. The total quantity of milk depends upon the quantity of milk available from primary societies and demand for milk and milk products which necessitates the procurement of milk from the SMG and reconstitution of milk from powder at the plant.

1. Production of milk varieties and milk products

The milk procured by the Nainital Dugdh Utpadak Sahakari Sangh (NDUSS) was mainly processed to produce liquid/processed milk varieties and milk products. The liquid/processed milk varieties include Standardized Milk (SM), Skimmed Milk (SKM), Toned Milk (TM), Double Toned Milk (DTM) and Full Cream Milk (FCM). The milk products produced include dahi, yogurt, paneer, ghee, cream, and butter. The fat taken out while standardizing the milk was converted into ghee and butter. Table 2 and 3 depict a detailed picture of production of milk varieties and milk products in the cooperative dairy plant, respectively.

Table 2. Seasonal pattern of production of liquid / processed milk at NDUSS

Year	Month	qty of SM	Index no.	qty of SKM	index no.	qty of TM	index no.	qty of DTM	index no.	qty of FCM	index no.
2012	April	2141200	100.64	40220	93.28	7911	120.89	14375	98.31	72022	79.37
	May	2222595	104.47	41154	95.45	8316	127.08	15910	108.80	77179	85.05
	June	2159247	101.49	40355	93.60	9802	149.78	17463	119.42	77033	84.89
	July	2137896	100.49	43577	101.07	7570	115.68	15926	108.91	83750	92.29
	Aug	2128832	100.06	42219	97.92	6592	100.73	15540	106.27	84993	93.66
	Sep	1969343	92.56	44460	103.12	6246	95.44	15422	105.47	85240	93.93
	Oct	2211275	103.94	47436	110.02	6325	96.65	15569	106.47	96623	106.48
	Nov	2060874	96.87	43639	101.21	5874	89.76	13640	93.28	98949	109.04
Dec	2052684	96.48	47146	109.35	5739	87.70	13165	90.03	101281	111.61	
2013	Jan	2017741	94.84	47113	109.27	4441	67.86	12860	87.95	101884	112.27
	Feb	2167890	106.27	38504	89.30	3922	59.93	11604	79.36	94489	104.12
	Mar	2260986	101.90	41569	96.41	5791	88.49	13997	95.72	115517	127.30
	Total	25530563		517392		78529		175471		1088960	
	Avg.	2127546.92	100	43116.00	100	6544.08	100	14622.58	100	90746.67	100

It can be seen from the Table 2 that Standardized Milk (SM) was the main product of the plant as about 25530 thousand liters. It was the policy of the plant to mainly manufacture fluid milk because of its compelling demand in the area. Its production depends upon the level of procurement of milk [5]. When the demand for milk was high, the plant got more milk from SMG and also increased the reconstitution of milk with powder. In case of standardized milk, it can be seen from the table that the production of standardized milk was highest in the month of March (2260986 liters) when the supply of milk from societies was maximum and lowest in the month of September (1969343 liters).

In case of Double Toned Milk (DTM), the production of DTM was highest in the month of June (17463 liters) and lowest in the month of February (11604 liters). The quantity of full cream milk produced was highest in March (115517 liters) and lowest in April (72022 liters). Besides producing processed milk varieties the union was also engaged manufacturing several milk products like dahi, yogurt, paneer, ghee, cream, and butter in different proportions. It was revealed from the Table 3 that the quantity of dahi was highest in the month of June (148321 kg) and lowest in the month of January (50838 kg), as the demand for dahi remained high during summer and lowest during winter. As we see from the table that quantity of panner produced was highest in November (31014 kg) and lowest in the month of September (14604 kg). As mentioned above, for making ghee and butter, the cream separated from milk while standardizing it, was used [6]. In other words, it is the milk procured from primary societies which were mainly used for this purpose.

Table 3. Seasonal pattern of production of milk products at NDUSS

Month	Qty of Dahi	Index no.	Qty of Yoghurt	Index no.	Qty of Paneer	Index no.	Qty of Ghee	Index no.	Qty of Cream	Index no.	Qty of butter	Index no.
April	130137	137.93	588	148.80	29416	134.28	4747	45.83	13856	81.69	10854	92.67
May	145718	154.45	764	193.34	24293	110.89	8802	84.98	12447	73.38	10084	86.09
June	148321	157.21	522	132.10	21981	100.34	8095	78.15	6331	37.32	4481	38.26
July	106395	112.77	513	129.82	16254	74.20	4835	46.68	7431	43.81	6293	53.73
Aug	93129	98.71	443	112.10	15896	72.56	7131	68.85	13536	79.80	11807	100.80
Sep	88627	93.94	496	125.52	14604	66.66	7093	68.48	14320	84.42	12149	103.72
Oct	97482	103.32	522	132.10	17931	81.85	10292	99.36	18170	107.12	15337	130.94
Nov	64926	68.82	330	83.51	31014	141.57	4745	45.81	14631	86.26	11548	98.59
Dec	53670	56.89	60	15.18	25291	115.45	9503	91.75	16360	96.45	13273	113.32
Jan	50838	53.88	57	14.42	22169	101.20	17600	169.92	22000	129.70	13619	116.27
Feb	57785	61.25	120	30.37	24700	112.75	6729	64.97	21000	123.80	13962	119.20
Mar	95140	100.84	327	82.75	19334	88.26	34722	335.22	43465	256.25	17147	146.39
Total	1132168		4742		262883		124294		203547		140554	
Average	94347.33	100	395.17	100	21906.92	100	10357.83	100	16962.25	100	11712.83	100

2. Utilization of milk into milk varieties and milk products and utilization of installed capacity of plant

Month-wise percent utilization of milk in making different products has been reported in Table 4. It is evident from the Table 4 that the total availability of 31933763 liters of milk, on an average, 86.18 per cent have been utilized for making liquid/processed milk varieties such as Standardized Milk (SM), Skimmed Milk (SKM), Toned Milk (TM), Double Toned Milk (DTM) and Full Cream Milk (FCM), 8.36 per cent has been utilized for making different milk products viz., dahi, yoghurt, paneer, ghee, cream, and butter and rest has been lost during production process. About 80.33 percent of total milk available was utilized for making SM, 4.16 percent for panner, 3.57 percent for dahi, 3.41 percent for FM and 1.63 percent for SKM, respectively. The articles of milk like double toned milk, toned milk, yogurt and cream each utilized less than one percent of total availability of milk.

The average loss of milk in transit, handling and processing were found to be 5.46 percent. The average loss of milk was highest in the month of March (18.97 percent) and January (16.41 percent). The installed capacity of NDUSS was 50,000 liter per day. If the plant had to become economically viable, capacity utilization should have been at least 70 percent [7]. It was revealed from the table that the plant capacity was over-utilized as on average 174.44 percent of the installed capacity of the plant. Moreover, none of the months recorded under-utilization of installed capacity of the dairy plant. The capacity utilization virtually varied from 154 percent in September to 206 percent in March.

4. Policy recommendations

Based on the insights provided by the study, the following policy implications have been suggested to make the NDUSS more skilled at the seasonal availability of milk and utilization pattern levels.

1. The co-operative dairy plant should make concerted effort to increase the level of milk procurement as procurement was quite low particularly during the period from May to Nov. In this context, imparting training to farmer-members at primary level regarding benefits of co-operative marketing may help to increase the milk procurement in the area.
2. Efforts are needed to make for providing the equipment to the dairy plant for convert milk into milk powder.
3. Ensuring remunerative and regular payments to primary members will stop diversion of milk sales to unorganized agencies. As a result, procurement will increase and consequently process and distribution of milk will get improved [8].

5. Conclusion

The study has observed that there were three sources of milk to NDUSS viz., primary co-operative societies, the state milk grid and the milk reconstituted at the plant from powder milk. The main source, however, was primary cooperative societies. The milk procured by the NDUSS was mainly processed to produce liquid/processed milk varieties and milk products. SM and dahi was the major product for NDUSS. The average loss of milk in transit, handling and processing were found to be 5.46 percent. This loss was highest due to the large quantity of milk was procured from society members. The union had no equipment to convert milk into milk powder, and hence the surplus quantity of procured milk was usually sent to Bareilly for converting surplus milk into powder milk. The powder milk is then utilized for reconstituting the milk at the plant for supplying the milk in deficit months.

As the production was affected by calving season and weather condition, thus there was no definite pattern observed in the production of milk and milk products. Its production mainly depends upon the local demand for dairy products.

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