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Utilization Patterns of Milk and Milk Products among Various End Users in Karnataka, India: A Comparative Analysis

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Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

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ABSTRACT

The utilization patterns of milk and milk products in Karnataka were investigated through a study of 100 farmers and 50 consumers. The focus was on how milk was retained, consumed and transformed into various products. It was found that significant variation existed in milk production and consumption across different herd sizes. Small, medium, and large farmers were reported to produce an average of 33.80, 45.18 and 66.26 liters of milk per day, respectively, with family consumption accounting for 19.23 per cent, 17.37 per cent and 15.84 per cent of their production. Larger herds were associated with increased milk production, which allowed for a greater surplus to be sold. Utilization patterns showed that small farmers retained 6.5 liters of milk daily, consuming 32.94 per cent as liquid milk and converting 64.23 per cent into curd, with minimal ghee production. In contrast, large farmers retained 10.5 liters daily, consuming 43.80 per cent as liquid milk and converting 53.12 per cent into curd. This indicated a trend towards higher liquid milk consumption and varying product transformation depending on herd size. Consumer data indicated that rural households spent an average of ₹141.18 on 2.41 kg of milk products daily, while urban households spent ₹142.10 on 2.25 kg. Despite higher costs, urban consumers spent more on liquid milk, whereas rural consumers allocated more to curd and ghee. These findings reflected regional price differences and consumption preferences. Overall, the study highlighted the complex dynamics of milk utilization, with varying consumption patterns and product transformations observed across different farmer categories and consumer demographics. This information was deemed crucial for optimizing milk production and distribution strategies in Karnataka.

Keywords: Milk utilization; milk products; herd size; milk consumption patterns; milk transformation; rural consumers; urban consumers.

1. INTRODUCTION

Agriculture plays a crucial role in the Indian economy and provides livelihoods for a significant portion of the population. Contributing approximately 18.3 percent to the national economy, the sector engages about 45.76 percent of the workforce in agriculture and allied activities (GOI, 2023). Among the various agricultural sectors, dairy farming has been pivotal in the socio-economic development of rural households. Livestock provides livelihood to two-third of rural masses and employs about 8.8 per cent population of India. While dairying alone ensures the livelihood of 70 million farm families. Livestock contributed 16 per cent to the income of small farm households as against 14 per cent for all rural households. The economic survey 2022-23 also highlighted another important trend of increasing contribution of the livestock sector. The livestock sector grew at a compound annual growth rate of 7.9 per cent during 2014-15 to 2020- 21 (at constant prices) [1]. The livestock sector contributes 5.1 per cent to Indian Gross Domestic Product (GDP) and shares 28 per cent of the total agriculture GDP [2,3,4].

Milk produced in the farm has multiple uses; either it is consumed as liquid milk or it can be utilized in different ways. In the study area, dairy farmers were found to consume the liquid milk or prepare different types of milk products for their household consumption. Similarly, *halwais* were also observed to procure raw milk directly from the milk producers or from other market intermediaries and convert the milk into different types of milk products. Finally, the consumers were found to be the end users of the milk products. Therefore, it is imperative to analyze the utilization pattern of milk at milk producers and *halwai* level and milk products at the consumer level.

Future production prospects depend heavily on productivity gains, primarily through improved breeding and optimum feeding practices. Demand for feeds and improved genetic features may offer opportunities for increased trade. India's dairy co-operatives and private sector processors have played a key role in expanding milk and milk-products marketing and catalyzing more production. India's network of farmer-owned dairy co-operatives, organized using the "Anand model" originated in the State of Gujarat before independence, has been one of the most successful co-operative movement in India and the critical early driver of dairy development in the country.

A major concern is that the unorganized sector handles approximately 80 percent of the total milk collection in India. For the organized sector to thrive, it requires a substantial number of

farmers to enhance milk productivity and ensure fair pricing. Strengthening the linkages through effective extension services is essential for achieving these goals. This study aims to explore strategies to make the dairy sector more competitive and profitable, particularly by improving livestock productivity through better management practices which involves optimizing nutrition, health, and breeding practices. Key strategies include providing balanced diets, ensuring regular veterinary care, and implementing selective breeding for better traits.

1.1 Specific Objectives

1) To study the Utilization Pattern of Milk and Milk Products in Karnataka.

2. MATERIALS AND METHODS

Utilization pattern of milk is defined as the process of consumption of raw milk or in the form of various milk products by different stakeholders. The producers retain some amount of milk for their family consumption, some portion as raw milk and remaining quantity of milk is converted to various milk products. The *halwais* procure raw milk either from the farmers or from vendors and utilize it to produce milk products. Likewise, both milk and milk products are also consumed by the non farmer- consumers to varying extent. Hence, primary data collection was done regarding the utilization of milk and consumption pattern of milk and products from 100 farmers and 50 consumers by personal interview method. Thus, total 100 producer households were distributed as 15 small, 24 medium and 61 large herd sized category households. After conducting personal interview, the data obtained from the milk producers were categorized in to small (2-11 milch animals), medium (12-15 milch animals) and large (16-24 milch animals) herd size categories using the cumulative square root frequency technique with milch animal as the basis of classification. Two major districts out of 30 districts in Karnataka namely, Mandya and Dharwad were selected purposively for the purposed study. Hebballi block from Dharwad district and Krishnarajpete block from Mandya district were selected randomly.

3. RESULTS AND DISCUSSION

Table 1 illustrates the average milk production and family consumption requirement of milk across different herd size categories. Overall milk production was estimated to be 48.41 liters per household per day which varied from 33.80 liter in case of small farmers up to 66.26 liter in case of large farmers. Overall family consumption requirement was found to be 8.28 liter per household per day which comprised of 17.48 per cent of the overall milk production. Family consumption requirement was found to be highest in case of large farmers (10.5 liter), followed by 7.85liter in case of medium farmers and it was least for small farmers (6.5 liter). The share of family consumption to average milk production was reported to be highest in case of small farmers (19.23%) as the small farmers were found to be basically concerned for meeting their daily requirement of milk. The share of family consumption to average milk production was found to be 17.37 per cent and 15.84 per cent in case of medium and large farmers, respectively. This is due to the fact that as the herd size increases, milk yield also increases which supports the farmers to sell more quantity of milk after meeting their family consumption requirements. Singh [5] reported that 91.00 per cent of the total milk produced was marketed surplus and 9 per cent of the remaining milk retained for consumption purposes at home. This is consistent with findings from a recent study by Ghosh et al. [6], which reported that smaller dairy farms often retain a larger proportion of milk for household consumption compared to larger farms, where surplus is more frequently marketed. This trend is consistent with recent findings by Singh et al. [7], who reported that smaller dairy operations retain a higher proportion of milk for family consumption compared to larger farms [7]. Similarly, Patel et al. [8] observed that large-scale operations more frequently market their surplus milk [8].

The amount of milk retained at home was calculated as the difference between milk production and sale. Table 2 indicates the total milk retained at home, the manner in which milk is consumed between specific classes. The overall daily average can be calculated from the Table 1. The quantity of milk retained was 8.28 liters for family consumption on daily basis. Household-wise study showed the average volume of consumed milk increased with the growth in family size.

Out of the family's total milk retained, 37.55 per cent consumed in liquid form and 62.45 per cent was transformed to curd and ghee. The total volume of milk retained for family use was the

highest in the case large herd size (10.5 liters) and lowest for small herd size (6.5 liters). Small size households consume 32.94 per cent as liquid milk along with curd (64.23%) and ghee (4.00%). Large households used 43.80 per cent as a liquid milk and converted to curd (56.12%) and ghee (3.00 %). Reddy [9,10] revealed that approximately, 71.00 per cent of total rural milk consumption was in the form of liquid milk and rest was transformed into products such as butter (70.00 %), ghee (17.00 %) and buttermilk (13.00 %). Meena and Bhavendra [11,12] reported that 40.00 per cent of the milk retained for domestic consumption was the liquid and 60.00 per cent was processed to milk products. Jaiswal [13] conducted a survey of market surpluses and factors affecting the choice of market outlets in Raipur district of Chhattisgarh and recorded that of total milk manufacturing; marketed surplus accounted for 63.41 per cent while the rest was used for household consumption. Gule [14] conducted a study on the economics of milk production and its disposal pattern on commercial dairy farms. Marketed surplus as a percentage of total milk production had been reported 94.48, 94.81 and 96.96 per cent, respectively, for small, medium and large farms. The results are similar to the studies conducted by Gangwar et al. [15], Gupta [16] and Inamke [17]. Similar trends were observed in a recent study by Patel et al. [8], which found that larger dairy operations typically process a higher percentage of milk into products like curd and ghee, compared to smaller farms where liquid milk consumption is more prevalent.

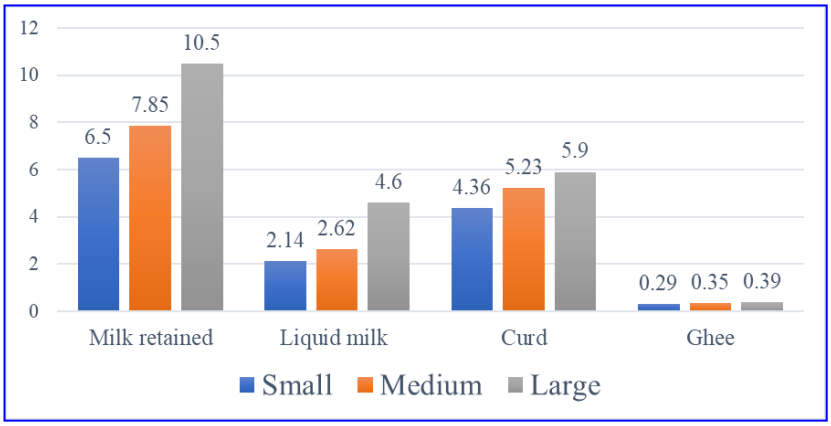

Fig. 1. Utilization pattern of milk by milk producers (liter/household/day)

Table 1. Average milk production and family consumption across different herd categories (liter/household/day)

Herd size category	Average milk production	Average family consumption	Percentage of consumption to production
Small	33.80	6.5	19.23
Medium	45.18	7.85	17.37
Large	66.26	10.5	15.84
Overall	48.41	8.28	17.48

Table 2. Utilization pattern of milk producers (liter/household/day)

Particulars	Quantity of milk retained in (liter)	Milk consumed as liquid milk	Milk converted into Curd	Ghee
Small	6.5	2.14 (32.94)	4.36 (64.23)	0.29 (4.00)
Medium	7.85	2.62 (33.39)	5.23 (62.47)	0.35 (4.40)
Large	10.5	4.6 (43.80)	5.9 (53.12)	0.39 (3.00)
Overall	8.28	3.11 (37.55)	5.16 (58.47)	0.34 (4.15)

(Figures in parenthesis indicate per cent of horizontal total)

Table 3. Utilization pattern of milk, milk products and consumers expenses

Milk products	Categories of consumers			
	Rural		Urban	
	Average quantity (liter or kg)	Average expenses (₹)	Average quantity (liter or kg)	Average expenses (₹)
Liquid milk	1.55	65.55	1.30	55.66
	(64.31)	(46.43)	(57.77)	(39.17)
Ghee	0.30	33.57	0.17	41.00
	(12.44)	(23.77)	(7.55)	(28.85)
Butter	0.05	5.22	0.09	9.78
	(2.1)	(3.69)	(4)	(6.88)
Curd	0.42	24.21	0.46	21.01
	(17.43)	(17.14)	(20.44)	(14.78)
Lassi	0.027	0.87	0.08	0.76
	(1.12)	(0.61)	(3.5)	(0.53)
Sweets	0.06	11.76	0.15	13.89
	(2.48)	(8.32)	(6.66)	(9.77)
Total	2.41	141.18	2.25	142.1
	(100.00)	(100.00)	(100.00)	(100.00)

(Figures in parenthesis indicate per cent of column total)

The expenses incurred by the consumers for purchasing the MMPs were analyzed and represented in Table 3 and from Table 3, it concluded that total average consumption of MMPs was estimated to be 2.41 and 2.25 kg per day in case of rural and urban consumers, respectively. Total daily expenses were estimated to be higher (₹141.18) in case of urban people in comparison to the rural people (₹142.1) due to higher market price of liquid milk and other milk products in urban area as compared to rural area. Liquid milk consumption was found to be lower in urban area (1.30) than the rural area (1.55 liters). Milk utilization in form of liquid milk was observed to constitute highest proportion (65.55%) in case of rural consumers, followed by curd (17.43%), ghee (12.44%), sweets (2.48%), lassi (1.12%) and butter (2.10 %), respectively. Therefore, the average expenses incurred by the rural consumers was found to be highest in case of liquid milk (46.43%), followed by ghee (23.77%), curd (17.14%), sweets (8.32%), butter (3.69%) and lassi (0.61%), respectively.

The urban consumers utilized highest proportion of milk as liquid milk (57.77%) which comprises of average expenses of 39.17 per cent of total expenses on MMPs, followed by curd (20.44%), ghee (7.55%), sweets (6.66%), butter (4.00 %) and lassi (3.50%), respectively. Das and Verma [18] stated that educated people were spending more on milk and milk products. The age of the household 's principal earner showed no major impact on the intake of milk and milk products. This is consistent with recent studies by Das and Verma [18] and Kumar et al. [19], which found similar expenditure patterns and preferences for liquid milk and other products in rural and urban areas [16,19,20,21].

4. CONCLUSION

The study on milk utilization patterns in Karnataka reveals notable differences in consumption and product transformation across varying herd sizes and consumer types. Small farmers primarily consume a larger proportion of milk as liquid, while larger farmers process a greater share of milk into curd. Urban consumers spend more on liquid milk despite its higher cost, while rural consumers allocate more to curd and ghee. These findings highlight the diverse preferences and economic factors influencing milk usage and expenditure. Policies should be tailored provide subsidies for dairy inputs, improved access to markets, and support for processing facilities to increase the value of milk products. Programs promoting the benefits of various milk products could help diversify consumption patterns and increase the demand for processed dairy items, benefiting both producers and consumers. To balance the disparity in milk prices between urban and rural areas, government interventions in price regulation and targeted subsidies could help make milk products more affordable across regions.

DISCLAIMER (ARTIFICIAL INTELLIGENCE)

Author(s) hereby declare that NO generative AI technologies such as Large Language Models (ChatGPT, COPILOT, etc) and text-to-image generators have been used during writing or editing of manuscripts.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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