***Original Research Article***

**Utilization pattern of milk and milk products by different consuming units in Andhra Pradesh, India: A Comparative Analysis**

**ABSTRACT**

Milk and dairy products are vital for a balanced diet and play important roles in the economy and culture. India is the world's largest producer and consumer of milk. A study was conducted on 80 farmers and 50 consumers to investigate the utilization patterns of milk and milk products in Andhra Pradesh. The focus was on how milk was retained, consumed, and transformed into various products. Findings indicate that small farmers consume 11.83% of their total milk production, while large farmers consume only 5.23%. Among the milk retained in households, the majority was utilized as liquid milk (61.72%), followed by curd (25.40%) and ghee (12. 88%).On average, daily liquid milk consumption is 1.24 liters, higher than that of milk products across both rural and urban areas. Rural areas consume slightly more liquid milk, while urban areas prefer curd. Ghee consumption is similar in both regions, with rural areas showing a marginally higher intake. Policies should focus on promoting milk preservation and value-added products like curd and ghee for small farmers. Strengthening urban-rural linkages can improve dairy distribution, while raising awareness on the nutritional value of all milk products will encourage balanced consumption. Financial support and education for efficient milk production can help boost the dairy sector.

**Keywords**: Milk production, Milk utilization, Dairy products, Milk consumption, Curd. Ghee, Rural and Urban, Livestock

**INTRODUCTION**

Livestock is crucial to the Indian economy, and dairy development is significant for creating income and jobs in rural areas. Dairy production boosts rural livelihoods by increasing per capita income (Squicciarini et al., 2017), enhancing food security, and providing a viable way out of poverty for smallholders (Randolph et al., 2007). The dairy sector is vital to India's agricultural economy, generating income and creating jobs that support rural communities (Naresha and Dixit, 2023). The dairy sector is a crucial resource for small and marginal producers, offering benefits like draught power and organic fertilizers that improve crop production. Milk is highly nutritious and plays a vital role in the diets of infants and lactating mothers. As the population grows and the economy develops, the demand for dairy products is set to increase significantly (Ohlan,2016).

 India is the world's largest producer and consumer of milk, with a production of 230.6 million tonnes and a per capita availability of 459 grams per day, accounting for 25% of the global output (GoI 2024). Milk production has significantly increased due to dairy development programs and higher consumer demand for value-added products. (Naresha et al.,2023; Sunil et al., 2016). Due to economic growth, a rising population, and increased health awareness, the demand for milk and dairy products is expected to rise, leading to a larger share of household income spent on these items (Krishnadas et al., 2016). Andhra Pradesh is the world’s largest milk producer, with a production of 15.45 million tonnes (MT) in 2022-23 and a per capita availability of 799 grams per day (GoI 2024). Dairy farmers reserve some liquid milk for their households and sell the rest through various channels. The amount set aside varies by state. Owning cows or buffaloes is believed to increase household milk consumption, especially among children (Bhagowalia et al., 2012). However, significant differences in milk consumption exist across states in India. Dairy consumption trends show that rural and urban areas are increasing their milk intake, but spending remains lower in rural areas than in urban ones(Ohlan,2016). Research comparing milk consumption in households with milch animals (producers) and those that purchase milk (non-producers) is limited. Additionally, understanding how much liquid milk households buy is important for milk marketing insights. While there is data on state milk production, there is little research on state-level consumption patterns. (Bhattacharjee & Patel, 2016).

Domestic households primarily consume milk in liquid form, whereas commercial households focus more on processing it into dairy products (Gupta, 1992). Marketing strategies vary, with producers selling milk to halwais, vendors, direct consumers, and cooperative societies, depending on financial and technical support (Badal, 1994; Rajadurai, 2002; Bairwa, 2004). Income levels also play a crucial role, as higher-income households exhibit greater per capita milk consumption, with diverse usage patterns, including tea whitener, curd, butter, and ghee (Gupta et al., 1995; Vinod, 2005). Cooperative societies emerge as key facilitators of milk marketing by providing financial and technical assistance, leading to higher sales through organized channels (Rajadurai, 2002; Bairwa, 2004). Overall, these findings underscore the importance of improving market linkages, strengthening cooperative networks, and promoting efficient milk utilization strategies to enhance dairy sector growth and sustainability. Thus this study aims to analyze the impact of household type, income levels, and market accessibility on milk consumption, utilization, and marketing strategies among small, medium, and large farmers, as well as rural and urban consumers. It also seeks to evaluate income-driven consumption patterns and market linkages to enhance dairy sector sustainability.

**REVIEW OF LITERATURE**

Gupta (1992) conducted Study on milk disposal patterns in the districts of Ropar and Patiala of Punjab in 1992. For the study, the milk producers were grouped into two categories, i.e., domestic and commercial households. It was found that about 46, 70 and 51 per cent of daily milk production in domestic households were consumed in the winter, summer and rainy seasons respectively as liquid milk. In case of commercial households, 17, 20, and 14 per cent was converted into milk products.

Badal (1994) conducted a study on disposal pattern of milk in Gopalganj district of Bihar and results shows hat out of total milk production, milk producers sell 39 per cent, 34.78 per cent and 26.18 per cent of milk to the halwai, milk vendors and to consumers respectively.

Gupta et al. (1995) In their study conducted on production and disposal pattern of milk among the different household income groups in Chandigarh, observed that the average milk consumption per capita tended to increase with income levels and that the overall average milk consumption was 0.597 liter per day. The study also found that households used 44.55 percent of milk as tea whitener, 30.54 percent as liquid milk, 4.75 percent used as curd and 10.16 percent used as butter.

Rajadurai (2002) conducted a study on economics of milk production in Madurai district of Tamil Nadu. It was reported that dairy farmers were selling 89.11 percent of marketed surplus to milk producer’s cooperative society (MPCS) followed by tea shops (9.82%) and directly to consumers (1.07%). The larger portion of milk marketing to society (MPCS) was due to financial and technical assistance provided by cooperatives to their members.

Bairwa (2004) conducted a study on production, consumption and marketed surplus of milk in the rural area of Tonk district of Rajasthan state and It was found that 45 per cent mpcs, 16 per cent halwai, 25 per cent consumer, 7 per cent tea stall, 5 per cent milk vendor, 2 per cent of total milk produced was sold to Milk Producers’ Cooperative Society (MPCS), halwais, consumer, tea stall, milk vendors and private dairy, respectively.

Vinod (2005) studied production, utilization and disposal pattern of milk in rural areas of Bidar district (Karnataka) and found that overall 36.12 per cent of milk consumed as liquid form and 63.88 per cent converted into dahi and ghee. Average quantity of milk retained for family consumption was highest in case of large herd size group (2.98 litres) and lowest for small herd size group (1.20 litres) In case of small size household category 37.50 per cent consumed as fluid milk and remaining converted into dahi (31.66 per cent) and ghee (30.88 per cent). In case of large household categories 35.23 per cent consumed as liquid milk followed by dahi (32.88 per cent) and ghee (31.87 per cent)

From the literature we can conclude that, milk production, consumption, and disposal patterns vary significantly across regions, influenced by household type, income levels, and market access. While domestic households consume a larger share of milk in liquid form, commercial households focus on processing it into dairy products. The marketing of surplus milk differs, with farmers opting for cooperatives, vendors, or direct sales based on financial and technical support availability. Additionally, income levels impact per capita milk consumption, and cooperative societies play a crucial role in dairy marketing. Understanding these patterns is essential for improving milk utilization, market efficiency, and dairy sector growth in different regions.

**METHODOLOGY**

The consumption pattern of milk refers to how different stakeholders utilize liquid milk and its various dairy products. While milk producers retain a portion for personal consumption, either as liquid milk or processed into other dairy products, non-producer consumers differ in their milk consumption levels and preferences. To analyze milk and milk product utilization, primary data was collected through personal interviews with 80 producer-consumer households and 50 non-producer-consumer households. After conducting a personal interview, the data obtained from the milk producers were classified into three herd size categories based on standard animal units (SAUs) namely Small (1-5 SAUs), Medium (6-9 SAUs) and Large (> 9 SAUs), using the cumulative square root frequency technique. Besides, the selection of dairy farmer-producers, 25 consumer households from rural and 25 consumer households from urban areas, adjoining selected villages, making a sample of 50 consumer households were interviewed personally to study their utilization pattern of milk and milk products.

**RESULTS AND DISCUSSION**

 Milk produced by the dairy farmers was observed to be utilized as liquid milk or converted into milk products such as curd and ghee. The milk products produced by the farmers were found to meet the family consumption requirements only.

Table 1 represents the average daily milk production and family consumption of milk across different categories of farmer households. It is evident from the table that the average milk production was to the tune of 21.56, 48.13, and 61.77 liter/farm/day for small, medium, and large herd size categories, respectively and overall average milk production was 39.07 liter/farm/day. Overall average family consumption of milk was worked out to be 2.73 liters per day which varied from 2.55 liters/day in the case of small farmers up to 3.23 liters/day for large farmers. The results depict that milk consumption per household has a positive relationship with the average family size. The proportion of milk used for family consumption relative to average milk production was found to be highest among small farmers (11.83%), as they primarily focus on meeting their household’s daily milk needs (Naresha and Dixit, 2024). In contrast, medium and large farmers consume 5.46% and 5.23%, respectively, since larger herd sizes allow them to sell more surplus milk. Studies support these trends, with Singh (2006) reporting that 91% of total milk production is sold, leaving only 9% for household consumption. Similarly, Ghosh et al. (2023) found that smaller dairy farms retain more milk for personal use, whereas larger farms prioritize selling surplus milk. These observations align with Singh et al. (2023) and Patel et al. (2022), who noted that large-scale farmers are more likely to market excess milk. Dairy farmers utilize milk either as liquid milk or by converting it into dairy products such as curd and ghee, primarily to meet household consumption needs.

**Table 1 Milk production and family consumption across different herd size categories (liter/day)**

|  |  |  |  |
| --- | --- | --- | --- |
| Herd Size | Average Milk Production | Family Consumption | Percentage of Consumption to Production |
| Small  | 21.56 | 2.55 | 11.83 |
| Medium  | 48.13 | 2.63 | 5.46 |
| Large  | 61.77 | 3.23 | 5.23 |
| Overall | 39.07 | 2.73 | 6.99 |

**Fig.1 Utilization pattern of milk and milk products (liters/day)**

 Table 2 represents the average on-farm utilization pattern of milk and the proportions of milk and milk products in total family consumption requirements. Overall farm utilization of milk was found to be highest in the form of liquid milk (61.72%), followed by curd (25.40%), and ghee (12.88%), respectively. The utilization of milk as liquid milk was found to be increasing with the herd size varying from 1.55 liter in the case of small farmers up to 1.85 liter in the case of large farmers due to an increase in average family size across the herd size. Utilization of milk for curd preparation was found to be highest in the case of large farmers (0.75 liters), followed by medium (0.67 liters) and small farmers (0.65 liters). Utilization of milk for ghee preparation was found to be highest in the case of large farmers (0.42 liter), followed by medium (0.33 liter) and small farmers (0.30 liter). Reddy (2005) found that about 71% of total rural milk consumption was in the form of liquid milk, while the remaining portion was processed into butter (70%), ghee (17%), and buttermilk (13%). Meena and Bhavendra (2015) reported that 40% of milk intended for domestic use was consumed as liquid, whereas 60% was converted into dairy products. Similarly, Jaiswal (2016) observed that in Raipur, Chhattisgarh, 63.41% of total milk production was sold as surplus, with the rest retained for household consumption. Gule (2010) found that the marketed surplus accounted for 94.48%, 94.81%, and 96.96% of total milk production on small, medium, and large farms, respectively. Studies by Gangwar et al. (1989), Gupta (1992), and Inamke (1998), along with Patel et al. (2022), also support this trend, indicating that larger farms tend to process more milk into products like curd and ghee, while smaller farms primarily focus on liquid milk consumption.

**Table 2: Utilization pattern of milk by producer households**

 **(liter/household/day)**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Particulars  | Small | Medium | Large | Overall |
| Total milk retained at household | 2.50 | 2.63 | 3.02 | 2.72 |
| Liquid milk consumed | 1.55(62.00) | 1.63(61.98) | 1.85(61.26) | 1.68(61.72) |
| Milk converted into products. |
| 1. Curd  | 0.65(26.00) | 0.67(25.48) | 0.75(24.83) | 0.69(25.40) |
| 2. Ghee  | 0.30( 12.00) | 0.33( 12.55) | 0.42( 13.91) | 0.35(12.88) |

*Figures in parentheses indicate the percent of the row's total.*

**Consumption pattern of milk and milk products (MMPs) by consumer households**

Consumers were found to be the end users of the milk and milk products.   Fifty consumers were selected, 25 each from both rural and urban communities to analyze their consumption patterns of milk and milk products (MMPs). The average quantity of milk and milk products consumed by the consumers on per per-day basis were analysed and represented in Table 3.

**Table 3: Consumption pattern of MMPs by consumer households**

 **(liter or kg/day)**

|  |  |
| --- | --- |
| Milk products | Categories of consumer households |
| Rural | Urban |
| Liquid milk | 1.24 | 1.21 |
| Curd | 0.32 | 0.50 |
| Ghee | 0.07 | 0.06 |

 The results depict that consumption of liquid milk (1.24 lit/day) was higher than milk products in both rural and urban areas. Results were found to be aligned with findings from Subramanian et al (2019), who reported thatOver the years, households in both rural and urban regions have preferred liquid milk over other forms of milk products. Milk consumption was higher in rural areas (1.24 lit/day) than the urban areas (1.21 lit/day). However, the quantity of curd consumed was higher in urban areas (0.50 lit/day) than the rural areas (0.32 lit/day). Average consumption of ghee was estimated to be 0.07kg and 0.06 kg in rural and urban areas, respectively. Das et al. (2011) found that in North Tripura District, 66% of rural households consumed liquid milk, while 34% consumed curd and 36% used ghee. In urban areas, the consumption rates were slightly higher, with 70% consuming liquid milk, 40% consuming curd, and 42% using ghee. Similarly, Krishnadas et al. (2015) reported that urban consumers in Kerala spent more on dairy products compared to their rural counterparts. Urban consumers spent 14.46% more on liquid milk and 33.13% more on curd and buttermilk than rural consumers. Agrawal and Kumar (2021) analyzed milk production and utilization patterns in Madhya Pradesh, finding that overall per capita milk availability was 1.49 liters per day, while per capita consumption stood at 0.37 liters per day. Among milk products, a nearly equal proportion of milk was used for curd (22.57%) and ghee (22.41%).

**CONCLUSION**

The study found that small farmers have the highest average family milk consumption, followed by medium and large farmers. This is because small farmers prioritize meeting their household’s daily milk needs over marketing, ensuring a steady supply of liquid milk for family consumption. As herd size increases, a larger proportion of milk is allocated for sale rather than home use, leading to relatively lower household consumption among medium and large farmers. Liquid milk remains the primary form of on-farm milk utilization across all herd sizes. However, the extent to which milk is processed into curd and ghee varies, with larger farmers using more milk for these products. This trend is driven by both higher milk production and greater family consumption in households with larger herds. Small farmers, on the other hand, retain more milk in its liquid form for direct consumption. In terms of regional consumption patterns, rural households consume slightly more liquid milk compared to urban households, reflecting the direct availability of fresh milk in villages. Urban areas, however, show a higher preference for curd, possibly due to changing dietary habits and increased demand for fermented dairy products. Ghee consumption is relatively similar across both regions, with rural households displaying a marginally higher intake, likely due to traditional cooking practices and greater availability of home-produced ghee.

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 the writing or editing of this manuscript.

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