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Marketing of major milk products (Ghee and Paneer) in Gaya district of Bihar

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Abstract
This study aimed to evaluate the marketing efficiency, market share, marketing margins, and costs of major dairy products (ghee and paneer) in Gaya district of Bihar. It also identified key marketing constraints and proposed recommendations. A multistage stratified sampling approach was used to survey 100 milk producers in the Gaya Town C.D. Block through personal interviews. Analytical tools included Chi-square tests, Garrett's ranking technique, and Acharya's marketing efficiency index to quantify marketing performance and rank marketing constraints. Results indicated that small-scale producers faced significant constraints, including inadequate transportation, price volatility, and lack of organized marketing channels. These factors reduced efficiency and eroded margins in the ghee and paneer markets, constraining the market share and profitability of small-scale producers in the dairy sector. Recommendations emphasized policy reforms to stabilize prices, improved infrastructure and transport networks, promotion of cooperative marketing models, and enhanced market access to strengthen marketing efficiency and producer welfare.

Keywords: Marketing efficiency, dairy marketing, ghee, paneer, marketing constraints, cooperative marketing

Introduction

India is the largest producer of milk in the world, and dairy farming plays a significant role in its rural economy. The dairy sector not only provides employment and income to millions of small and marginal farmers but also contributes substantially to the country's nutritional security. Among the various dairy products, *ghee* (clarified butter) and *paneer* (cottage cheese) are widely consumed across Indian households due to their cultural, nutritional, and culinary significance. These products hold immense economic potential, especially in rural regions where milk production is a key agricultural activity. Bihar, with its large agrarian population and growing demand for dairy products, has emerged as a major player in India's dairy industry. Within Bihar, the Gaya district holds a prominent position due to its favourable agro-climatic conditions, high milk yield, and active participation of farmers in dairy cooperatives and local milk societies.

Marketing of milk products such as ghee and paneer, however, faces several challenges at the grassroots level. Despite increasing demand, the supply chain remains fragmented, and marketing infrastructure is underdeveloped in many rural areas. Gaya district, although rich in milk production, lacks an organized framework for the processing, branding, and distribution of value-added products like ghee and paneer. Local producers and dairy cooperatives often struggle with inadequate cold chain facilities, poor packaging standards, limited access to urban markets, and low awareness about market trends. In addition, the presence of unorganized players and fluctuating milk prices further complicate the business environment for small-scale processors and sellers. As a result, farmers often sell raw milk at low prices rather than investing in the processing of value-added dairy products, thereby missing opportunities for higher income generation.

The marketing of ghee and paneer in Gaya involves multiple stakeholders milk producers, dairy cooperatives, private dairy firms, wholesalers, retailers, and consumers. The efficiency of this marketing system depends on several factors such as pricing strategies, consumer preferences, product quality, branding efforts, transportation facilities, and government support. While cooperatives like Sudha (Bihar State Milk Co-operative Federation) have made significant inroads in streamlining milk collection and distribution, the marketing of processed dairy products still requires targeted efforts. There is a need to explore how milk producers can transition from selling raw milk to manufacturing and marketing ghee and paneer on a commercial scale. Understanding consumer preferences, identifying potential markets, strengthening value chains, and building capacity among farmers are essential steps toward achieving this goal.

Furthermore, government initiatives under schemes like the National Dairy Plan and Rashtriya Gokul Mission aim to improve dairy infrastructure and enhance the productivity and profitability of the sector. However, the implementation of these schemes at the district level remains a concern. This research on the marketing of major milk products in Gaya district aims to explore the current practices, challenges, and opportunities in marketing ghee and paneer. By assessing the existing marketing channels, understanding the problems faced by stakeholders, and recommending feasible strategies, the study hopes to contribute valuable insights to policymakers, dairy entrepreneurs, and farmers. A strong and efficient marketing system for milk products can not only uplift the rural economy of Gaya but also ensure quality and availability of traditional dairy products to a wider consumer base.

Objectives of the Study

- To workout marketing efficiency, market share, market margin, market cost.
- To examine constraints and suitable suggestions in marketing of milk product.

Review of Literature

Faizan Hasan Mustafa (2016) highlights the application of AI in fish farming, focusing on AI-based systems for controlling water quality parameters like salinity and oxygen. The system improves accuracy, reduces costs, and ensures sustainability in fish hatcheries with minimal complexity.

Shava (2017) [1] examines the implementation of fish farming in drought-prone Zimbabwe to enhance food security and create employment. NGOs introduced fish farming in Mwenezi district, and qualitative research explored its benefits for households, demonstrating its role in improving food security.

Karakor (2017) [2] discusses the growing importance of quality assurance programs in food processing and farming, particularly in the dairy industry. These programs are cost-effective and help reduce risks while improving profitability by aligning farm plans with industry standards and individual farm conditions.

Ullah (2018) [3] presents a system architecture for intelligent fish farms, utilizing IoT for continuous monitoring of fish tanks. The study proposes optimization strategies for controlling water pumps to maintain efficient energy usage and water levels, resulting in significant cost reductions.

Chakraborty (2018) [4] studies the socio-economic aspects of dairying in India, focusing on milk production costs and marketing in rural households. The research identifies factors affecting profitability, marketing channels, and constraints, offering insights into improving dairy farm economics in the Nadia and North 24 Parganas districts.

Sibanda & Simela (2018) [5] explore the success of Rural Dairy Associations in Zimbabwe, which have enhanced milk production and consumption, improving food security. By empowering rural communities with animal husbandry and dairy technology, the project has created commercially viable enterprises and boosted rural income.

Kumar (2018) [6] examines the role of animal husbandry and dairying in India's development, highlighting milk production statistics. The study focuses on the economic analysis of milk marketing in Faizabad district, analyzing production data and the role of Parag dairy in the local economy.

FAO (2019) [7] discusses food loss as a major environmental and global food security issue. The report highlights how irrational food use leads to food waste, which not only harms the environment but also represents missed opportunities to improve food security worldwide.

Ramaya (2019) [8] introduces a method for maintaining stable water levels in fish tanks to ensure a safe and healthy environment for fish farming. By monitoring water quality indicators such as pH and temperature, the technique aims to prevent fish deaths and improve long-term sustainability.

Research Methodology

Research methodology refers to the systematic procedures and techniques used by researchers to plan, conduct, and analyze a study. It forms the backbone of any empirical investigation, ensuring that the study is both valid and reliable. The present study on the "Marketing of Major Milk Products (Ghee and Paneer) in Gaya District of Bihar" employs a well-structured methodology to explore existing practices, assess marketing constraints, and identify opportunities for improvement in the region's dairy value chain.

For the purpose of this study, multistage stratified random sampling was adopted. In the first stage, Gaya district was selected randomly from among 38 districts in Bihar, based on its significant milk production. In the second stage, Gaya Town C.D. Block was purposively selected due to its high dairy activity. In the third stage, villages were selected randomly with the assistance of the Block Development Office 5% of total villages were chosen. Finally, in the fourth stage, respondents were selected randomly with the help of local Gram Pradhans. From a complete list of milk producers, 10% were chosen, ensuring representation across different categories of milk producers marginal, small, semi-marginal, medium, and large.

A sample size of 100 milk producers was finalized using a statistical formula considering standard deviation and desired precision. Primary data were gathered through personal interviews using structured questionnaires focusing on cost, price, marketing channels, and challenges faced by producers. Secondary data were sourced from government records, websites, and existing literature. Convenience sampling was also employed to ensure timely and cost-effective data collection.

Various analytical tools were used including simple percentages, tables, graphs, and ranking methods. Advanced tools like Chi-square analysis, Garrett's ranking technique, and Acharya's Index of Marketing Efficiency were applied to interpret data. Marketing channels from producer to consumer were mapped, providing a clear picture of the distribution flow. This methodology thus ensures comprehensive and reliable insights into the marketing dynamics of ghee and paneer in Gaya district.

Data Analysis and Interpretation

Table 1: Effect of supply chain on the price of the milk and milk product

Supply chains	Milk production cost RS/L	Milk sell cost RS/L	Consumer's price RS/L	Difference profit to producer RS/L	Cost spent market RS/L	Percentage Difference RS/L
CH1	30	45	45	15	0	50
CH2	30	45	50	15	5	66.67
CH3	30	45	52	15	7	73.33
CH4	30	45	56	15	11	86.67

The table compares four milk marketing channels. In all, producers earn ₹15/litre, but consumer prices and marketing costs vary. CH1 is most efficient with no marketing cost. CH4 has the highest consumer price and cost, showing least efficiency. Intermediaries increase prices, reducing overall marketing efficiency despite constant producer profit.

Table 2: Analysis of the cost of production of milk and post products

Sr. No.	Item of cost	Animals (280 day) (Rs)			
		Small	Medium	Large	Overall
1.	Feed and fodder	15225	12435	11539	9733
2.	Veterinary Charges	499	460	322	427
3.	Human Labour	4720	3892	2338	3650
4.	Housing Expenditure	592	326.3	139.9	352.73
5.	Interest on animal value	3728	5177	8900	5965
6.	Miscellaneous	405	375	360	380
	Total Cost	25169	22665.3	23688.9	23841.07
	Income from dung	614	554	491	553
	Income from young stock	552	650	730	644
	Net cost of milk production	24003	21461.3	22467.9	22644.07
	Net cost of ghee/kg	333.3	326.35	319.76	326.47
	Net cost of paneer/kg	205.09	204.35	201.45	203.63

This table breaks down the cost structure of milk production for small, medium, and large-scale producers. It includes feed, veterinary charges, human labor, housing, interest on animal value, and miscellaneous costs. It also calculates income from dung and young stock, along with net costs for milk, ghee, and paneer production.

Table 3: Economics of milk per milch animal per day

	Small	Medium	Large	Overall
Net cost	85.73	76.65	80.24	80.87
Milk Yield(lt)	5.03	4.24	4.14	4.47
Price of Milk (Rs)	27.37	26.84	26.62	26.94
Gross Return (Rs)	137.67	113.8	110.21	120.42
Net profit (Rs)	51.95	37.15	29.96	39.55
Benefit Cost Ratio	1:0.61	1:0.48	1:0.37	1:0.49

This table shows the financial performance of small, medium, and large-scale milk producers. It includes net costs, milk yield, price of milk, gross returns, net profits, and benefit-cost ratios. The benefit-cost ratio indicates the profitability of milk production for each scale, with the overall ratio at 1:0.49.

Table 4: Analysis of the marketing efficiency. economics of major milk products per unit

	Small	Medium	Large	Overall
Net cost of ghee/ kg	333.3	326.35	319.76	326.47
Net cost of paneer/ kg	205.09	204.35	201.45	203.63
Price of ghee/kg	500	500	500	500
Price of paneer/kg	250	250	250	250
Net profit on ghee (Rs/kg)	166.7	173.65	180.24	173.53
Net profit on paneer (Rs/kg)	44.91	45.65	48.55	46.37
Benefit cost Ratio of ghee	0.5	0.53	0.56	0.53
Benefit cost Ratio of paneer	0.22	0.22	0.24	0.23

This table presents the cost and profit analysis for ghee and paneer production. It shows the net costs, selling prices, and net profits per kilogram for each scale of production. The benefit-cost ratios indicate the profitability of producing ghee and paneer, with overall higher profitability for ghee production.

Table 5: Analysis of marketing efficiency

Supply chain	Producer selling cost	Consumer price	Marketing cost	Marketing efficiency
CH1	500	500	0	1
CH2	500	530	30	0.94
CH3	500	550	50	0.91
CH4	500	570	70	0.89

This table outlines the marketing efficiency across different supply chains (CH1 to CH4). It compares the producer's selling cost, consumer price, marketing cost, and marketing efficiency. As the marketing cost increases, the marketing efficiency decreases, indicating less cost-effectiveness in higher-cost supply chains.

Table 6: Analysis of marketing efficiency and marketing of ghee

Supply chain	Producer selling cost	Consumer price	Marketing cost	Marketing efficiency
CH1	250	250	0	1
CH2	250	280	80	0.9
CH3	250	310	60	0.84
CH4	250	340	90	0.79

This table presents the marketing efficiency for various supply chains (CH1 to CH4). As the consumer price increases, the marketing cost also rises, leading to a decline in marketing efficiency. CH1 shows the highest efficiency, while CH4 has the lowest, highlighting a reduction in cost-effectiveness with increased prices and costs.

Table 7: Constraints in marketing in village

Factors	In Figure	Small (%)	Medium (%)	Large (%)	Overall (%)
Low price/non-remunerative prices	250	76	63	80	73
No ready market	125	71	38	60	60
Malpractices in weighing	210	65	38	40	53
Lack of cooperative marketing system in village	110	76	50	80	70
Dominance of traders in village	150	59	25	40	47

This table highlights the percentage of respondents facing various challenges in milk production across different farm sizes (Small, Medium, and Large). "Low price/non-remunerative prices" is the most common issue across all sizes, followed by "Lack of cooperative marketing system." The dominance of traders is the least concerning factor, especially for medium and large farmers.

Table 8: Constraints in marketing in Gaya Town C.D. and Gaya Mandi

Factors	Small (%)	Medium (%)	Large (%)	Overall (%)
Lack of market information	59	25	20	43
Lack of transportation	53	38	40	47
High transportation cost	53	50	60	53
Existence of large number of intermediaries in Marketing process	53	63	80	60
Higher margin of middlemen	47	38	60	47
Lack of labor for loading and unloading	59	50	80	60
Losses during transportation/transactions	41	25	40	37
Higher price fluctuations	76	63	80	73
Unorganized marketing system	71	50	80	67

This table outlines the challenges faced by farmers of different sizes regarding market-related issues. "Lack of market information" is a prominent issue for small farmers, while "Existence of a large number of intermediaries" and "Higher price fluctuations" affect all farm sizes. Transportation challenges are also significant across categories.

Table 9: Constrains in marketing in Gaya Town C.D.and Gaya Mandi

Problem/Constraint	Respondents (n=100)	
	Frequency	%
Problem of storage facilities	35	35
Lack of transportation facilities	70	70
High transportation cost	65	65
Problem of drayage and spoilage	50	50
Delay in payments	30	30
Higher price fluctuations	55	55
High cost of labor	40	40
Lack of processing industries/units	20	20

This table highlights various issues faced by respondents, with "Lack of transportation facilities" being the most common problem (70%). Other significant issues include "High transportation cost" (65%) and "Problem of drayage and spoilage" (50%). "Lack of processing industries" is the least reported issue (20%).

Table 10: Middlemen related constraints for mandi

Particulars	Frequency	Ranking
Lack of transportation facilities	70	I
High transportation cost	65	II
Higher price fluctuations	55	III
Problem of drayage and spoilage	50	IV
High cost of labour	40	V
Problem of storage facilities	35	VI
Delay in payments	30	VII
Lack of processing industries/units	20	VIII

This table ranks various problems faced by respondents. "Lack of transportation facilities" is the most significant issue, ranked first (70%). "High transportation cost" follows in second (65%), with "Lack of processing industries" ranked last (20%). Each problem is ranked based on its frequency.

Conclusion

The analysis of the various constraints and challenges faced in the dairy supply chain reveals critical insights into the underlying issues impacting efficiency and profitability. The most significant challenges reported by respondents include lack of transportation facilities, high transportation costs, and higher price fluctuations. These factors are ranked as the top constraints, underscoring the vital role that logistics and price stability play in dairy production and distribution. The lack of proper storage facilities and drayage problems also pose significant challenges, which result in spoilage and financial losses for producers.

The data further indicates that small-scale producers face unique challenges compared to medium and large-scale producers, with price fluctuations and a lack of market information being particularly burdensome. This calls for targeted interventions to support small producers, such as access to better market data, enhanced transport infrastructure, and storage solutions. The study also highlights the importance of establishing more organized marketing systems, reducing the dominance of traders, and promoting cooperative marketing models. These measures could improve transparency, reduce intermediaries' margin, and ensure fair pricing for producers. Addressing these constraints through policy changes, infrastructure development, and market reforms will enhance the sustainability and profitability of the dairy sector.

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