

Mapping the Dairy Supply Chain in Bangladesh: A Case Study of Rajshahi Division on Consumer Demand, Supply Challenges, and Ethical Practices

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Abstract

This study examines the dairy supply chain in Rajshahi, situated within Bangladesh's northern milk belt, a region that enjoys structural production advantages yet fails to translate them into consumer affordability or farmer profitability. Using a descriptive cross-sectional design, data were collected through an online survey of youths ($n = 74$), in-person interviews with parents and working professionals ($n = 15$) and shopkeepers ($n = 22$), and phone interviews with dairy farms ($n = 4$) during July–August 2025.

The findings reveal that farmers face high feed costs ($\approx 55\%$ of total expenses) and report marginal profitability, while retailers depend heavily on distributors, creating weak traceability and limited producer visibility. Youth consumers demonstrate high price sensitivity, whereas families emphasise adulteration concerns, highlighting a persistent trust–price paradox. Despite higher production capacity in the north, uniform maximum retail prices (MRPs), partial cold-chain adoption, and reliance on middlemen prevent regional advantages from benefiting producers or consumers. The study concludes that fairer pricing mechanisms, improved cold-chain infrastructure, and stronger traceability systems are essential for balancing growth, consumer trust, and producer sustainability in Bangladesh's dairy sector.

Key Words: Dairy supply chain; Rajshahi; Bangladesh; consumer behaviour; wholesaler, retailer, suppliers/Ghosh, farm profitability; middlemen; adulteration; cold chain; milk market; value chain

Introduction

Dairy plays a pivotal role in Bangladesh's agricultural economy and nutritional landscape. More than half of the population is engaged in agriculture and livestock farming, with dairy products serving as both a dietary staple and a critical source of rural livelihoods. (Hamid, 2014). Approximately 20% of the total population and nearly 75% of rural households depend directly or indirectly on livestock, with milk and milk-derived products forming the cornerstone of both income generation and household nutrition security. (Uddin, 2016).

Milk is particularly vital for national food security as it is one of the richest single sources of essential nutrients, providing protein, fat, carbohydrates, vitamins, and minerals. (Hossain, 2016). Traditional dairy products such as butter, curd, cream, chana, and ghee remain deeply embedded in Bangladeshi diets, supplementing household nutrition while sustaining smallholder incomes through informal and semi-formal markets. (Kabir, 2016).

Despite its importance, Bangladesh faces a persistent production–consumption gap. In 2019, national milk production was estimated at 10.47 million tonnes against a demand of 16.49 million tonnes. (International Dairy Research Network (IDRN), 2020). This shortfall leaves per capita availability at only 126 ml/day, far below the recommended 250 ml/day. (Kabir, 2016). Consequently, Bangladesh meets just 54–63% of its domestic milk requirement, depending on the source. (International Farm Comparison Network (IFCN), 2019).

The structural weaknesses of the sector are exacerbated by price volatility and rising production costs. Producers face mounting feed and input expenses, while consumers contend with rising retail milk prices, even as output struggles to meet national demand. These challenges highlight the need for a comprehensive understanding of the dairy supply chain, especially in the northern belt (Sirajganj, Pabna, Bogura, and Rajshahi), which accounts for nearly half of the country's total production. (Netherlands Enterprise Agency (RVO), 2023).

Against this backdrop, Rajshahi provides a relevant case study to explore how retailers, distributors, farms, and consumers interact in the dairy supply chain. This research,

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Volume 16, Issue 01, 127-156. 10-10-25 ISSN: 2617-7420 (Print), 2617-7420 (Online)
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conducted between July and August 2025, employed a descriptive cross-sectional design: an online survey with youth (n = 74), in-person interviews with parents and working professionals (n = 15), shopkeepers representing diverse outlets such as tea stalls, sweet shops, local groceries, and branded super shops like Aarong and Pran (n = 22), and phone interviews with dairy farms (n = 4). The mixed-method approach allows for a comprehensive examination of price elasticity among youth, adulteration concerns among families, cost burdens faced by farms, and retailer dependency on distributors

Problem Statement

Despite the northern belt's structural advantages in dairy production, Rajshahi's market faces persistent inefficiencies. Farmers struggle with high feed costs ($\approx 55\%$ of expenses) and low farm-gate prices, leaving most with only marginal profits. Retailers remain dependent on distributors, with weak traceability and limited cold-chain adoption. On the demand side, youths are highly price-sensitive, while families emphasise adulteration concerns. As a result, neither producers nor consumers benefit fully from the region's natural advantages—uniform MRPs, poor transparency, and weak infrastructure continue to constrain fair pricing, profitability, and consumer trust. (Netherlands Enterprise Agency (RVO), 2023; The Daily Star, 2025; bdnews24.com, 2025; interviews, 2025).

Research Objectives

- To map the structure of the dairy supply chain in Rajshahi, identifying the roles of retailers, consumers, and intermediaries, and evaluating the influence on pricing, product flow, and traceability.
- To assess how farms, suppliers (Ghosh) manage production costs, including feed, veterinary services, maintenance, and transport, and to analyse how these costs shape their pricing and business decision-making.
- To compare the Rajshahi dairy market with other divisions of Bangladesh, focusing on production levels, pricing structures, supply chain efficiency, and consumer trust, to highlight regional advantages and systemic gaps.

Research Questions

The following research questions guide the study:

- What is the framework of the dairy supply chain in Rajshahi from retailers to end consumers, and is there any middleman influence on pricing, product flow, and traceability?
- How do farms/suppliers/Ghosh manage production and its costs (feed, vet, maintenance, transport), and how do these affect their decision-making?
- How does the dairy market in Rajshahi compare with other divisions of Bangladesh in terms of production levels, pricing structures, supply chain efficiency, and consumer trust?

Literature Review

The dairy sector of Bangladesh has long been recognised as a cornerstone of rural livelihoods and national food security. (Hamid, 2014) Highlighted that over half of the population is engaged in agriculture and livestock farming, with dairy products providing both nutrition and income. (Uddin, 2016) Further emphasised that nearly 75% of rural households depend directly or indirectly on livestock, underscoring dairy's role in poverty reduction. Studies also point to milk's nutritional significance, providing essential protein and micronutrients critical for balanced diets. (Hossain, 2016) .

Consumer perspectives on dairy reveal both opportunities and challenges. (Kabir, 2016) Noted that while urban and rural consumers highly value dairy products, concerns about adulteration and price instability reduce trust. (Muzareba, 2021) Reinforced this by showing that although northern Bangladesh enjoys strong production capacity, quality control and fair pricing remain unresolved, creating disparities between farmers and consumers.

From a supply chain perspective, global and national reports highlight structural inefficiencies. (International Farm Comparison Network (IFCN), 2019) observed that Bangladesh meets only about 60% of its milk demand, leaving a persistent production–

consumption gap. Similarly, (International Dairy Research Network (IDRN), 2020) stressed that per capita availability is far below nutritional recommendations. The (Hossain, 2016) study recognised the northern belt (Sirajganj, Pabna, Bogura, Rajshahi) as the “milk basket of Bangladesh” due to abundant fodder and dense farm clusters, yet also identified uniform maximum retail prices (MRPs) and weak cold-chain adoption as barriers to fair distribution of regional advantages. These studies together establish the need for localised supply chain analysis, particularly in Rajshahi, to understand consumer demand, supplier challenges, and systemic gaps.

Methodology

This study employed a descriptive cross-sectional design to investigate the dairy supply chain in the Rajshahi division. Data were collected between July and August 2025 using a mixed-method approach. An online questionnaire was administered to 74 youths (aged 18–30) to capture consumption behaviours, while 15 parents and working professionals (30+) were interviewed in person to reflect family-level concerns. To understand the retail dimension, 22 shopkeepers (from local shops, tea stalls, sweet shops, and branded super shops such as Aarong and Pran) were interviewed. Additionally, four dairy farms were reached via phone interviews due to logistical constraints.

Data analysis was performed using IBM SPSS Statistics (Version 31.0) for descriptive statistics, supported by Microsoft Excel for tabulation and visualisation. To enhance presentation and interpretation, OpenAI models were applied for generating structured summaries and clear visual outputs. Ethical protocols were followed by ensuring informed consent, anonymity, and voluntary participation throughout the study.

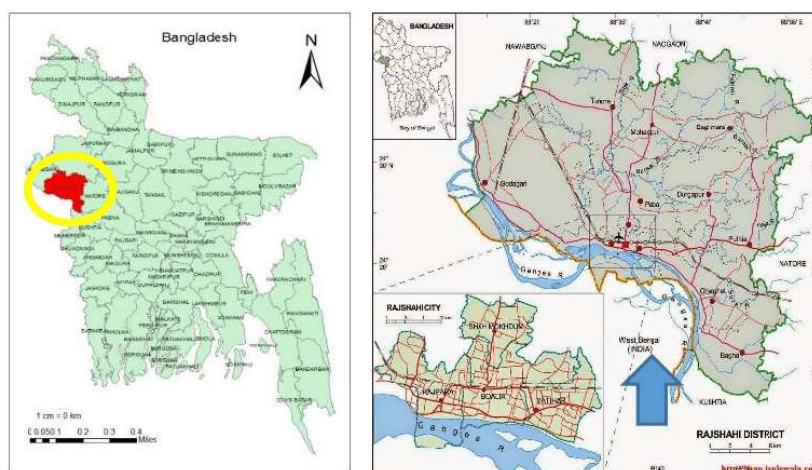


Figure 1: Map of Bangladesh highlighting the study area

The study area was Rajshahi Division, located in the northwestern part of Bangladesh. As illustrated in Figure X, the division comprises eight districts, including Rajshahi, Bogura, Sirajganj, and Pabna, which together represent a core part of the northern dairy belt. This region was chosen for its structural advantages in dairy farming, such as abundant fodder, clustered farm networks, and cultural demand for dairy products.

Findings and Discussion

Retailer to Consumer Supply Chain & Middlemen Role

Stakeholders in the Dairy market

The dairy market in Rajshahi involves a diverse network of stakeholders, each shaping how milk is produced, distributed, and consumed. Understanding their roles is essential to interpreting the supply chain dynamics and challenges observed in this study.

- **Farmers (Smallholders & Cluster Farms):** Primary producers responsible for milk production. They face high feed costs, veterinary expenses, and limited bargaining power due to low farm-gate prices.
- **Ghosh / Suppliers:** Act as intermediaries, aggregating milk from farms and supplying retailers. Their dominance creates both opportunities (ensuring market flow) and barriers (weak traceability, price control).

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- **Retailers (Local Shops, Tea Stalls, Sweet Shops, Super Shops):** The last-mile sellers who directly influence consumer access. Many depend heavily on distributors, limiting their knowledge of the actual producer.
- **Consumers (Youth & Families):** Demand is shaped by price elasticity among youth and adulteration concerns among families, highlighting a trust–price paradox.
- **Processors & Brands (e.g., Aarong, Pran, Milk Vita, Farm Fresh):** Large-scale players ensuring packaging, branding, and national distribution, but enforcing uniform MRPs that ignore regional production advantages.

This multi-actor ecosystem explains why systemic issues—such as high farm costs, uniform consumer pricing, and weak traceability—persist despite regional production advantages.

Marketing Channel of the Dairy Sector

In Rajshahi, dairy farmers supply milk through multiple channels, but distribution is uneven. Only a small share ($\approx 1\%$) reaches consumers directly at the farm gate, while sweetmeat shops (30%) remain a major outlet due to the region's cultural demand for sweets. A significant proportion flows to retailers (37%), serving everyday buyers in local shops and markets. Meanwhile, sales centres (32%), often linked with branded outlets or cooperatives, represent the growing modern channel. This structure shows that Rajshahi's dairy market is still dominated by traditional sweet shops and retailers, but formal sales centres are gaining importance.

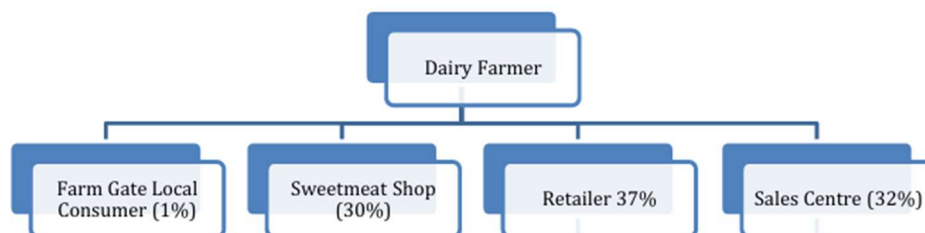


Figure 2: Marketing Channels of Dairy

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Consumer Demand Behaviour

90.5% of younger respondents (52.7% agree, 37.8% strongly agree) said dairy is essential for health. This result highlights a strong awareness of dairy's nutritional value among youth. However, when compared with their actual consumption frequencies (next figure), it reveals a gap between knowledge and practice; they recognise health benefits but fail to maintain consistent consumption.

Table 1 Younger age opinions about dairy products are essential for health.

		Frequen cy	Percent	Valid Percent	Cumulative Percent
Valid	Strongly agree	28	37.8	37.8	37.8
	Agree	39	52.7	52.7	90.5
	Neutral	6	8.1	8.1	98.6
	Disagree	1	1.4	1.4	100.0
	Total	74	100.0	100.0	

Among the surveyed parents and families, a strong consensus emerged regarding the nutritional importance of dairy products. Nearly half of the respondents (46.7%) strongly agreed that dairy is essential for health, while another 40% agreed, bringing overall positive responses to 86.7%. Only a small fraction expressed neutrality (6.7%) or disagreement (6.7%). These findings suggest that adult consumers, particularly parents responsible for family food choices, place significant emphasis on dairy as a vital component of a healthy diet, reflecting both awareness of its nutritional value and a generally positive attitude toward its regular consumption.

Table 2 Parents' and families' opinions about dairy products are essential for health.

		Frequen cy	Percent	Valid Percent	Cumulative Percent
Valid		1	6.7	6.7	6.7
	Strongly agree	7	46.7	46.7	53.3
	Agree	6	40.0	40.0	93.3
	Neutral	1	6.7	6.7	100.0
	Total	15	100.0	100.0	

Frequency analysis shows that 45.9% of youth respondents reported milk as their primary dairy purchase, followed by yoghurt (18.9%) and sweets (20.3%). In contrast, the older group (30+) showed a stronger preference for liquid milk (53.3%), often combined with powdered milk and ghee. This indicates that while young people diversify across products, family buyers consistently prioritise liquid milk for household consumption.

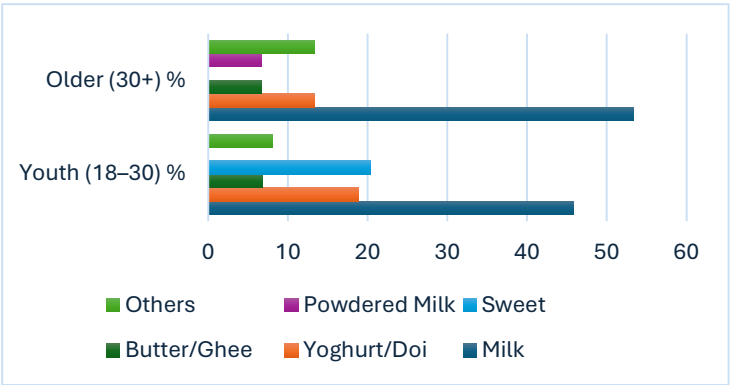


Figure 3: Primary Dairy Product Preferences among Youth (18–30) and Adults (30+)

The frequency distribution from 22 shopkeepers shows that Aarong Liquid Milk 200ml (13.6%) and Farm Fresh Liquid Milk 200ml (13.6%) are the most frequently sold packaged products, followed closely by Dano Powder Milk small pack (9.1%), and Pran Liquid Milk 200ml (9.1%). Yoghurt products also account for a significant share (22.7% when grouped), indicating continued consumer demand for traditional dairy. The results confirm that liquid milk and powdered milk dominate the retail market, with Aarons and Farm Fresh leading branded sales, while yoghurt remains essential in local preference.

Consumers Purchase Behaviour

The frequency chart illustrates this gap clearly: among youth, only 6.8% consume dairy daily, while 54.1% consume weekly and 33.8% monthly. In contrast, 33.3% of older respondents consume daily, and 20% 3–6 times per week. This shows that older generations maintain more consistent dairy intake, while youth consume irregularly, often constrained by price. The research implication is strong: awareness campaigns alone are insufficient; affordability and accessibility must be addressed to close the gap between nutritional awareness and actual consumption.

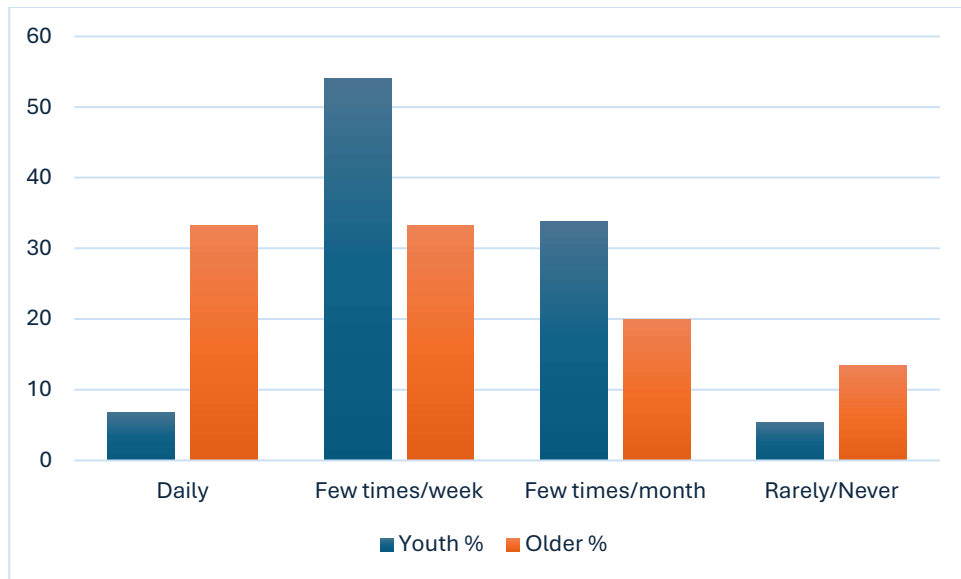


Figure 4: Comparative Dairy Consumption Frequency among Youth (18–30) and Adults (30+)

The pie chart shows that when prices increase, 58% of youth reported they buy less, while 31% reported no change. A small minority switched to cheaper brands (4%) or stopped buying some items (4%). This confirms that youth consumers are highly price-elastic, reducing their dairy intake in response to rising costs. Despite recognising dairy as essential, affordability remains the key constraint, explaining the lower daily consumption rates observed earlier.

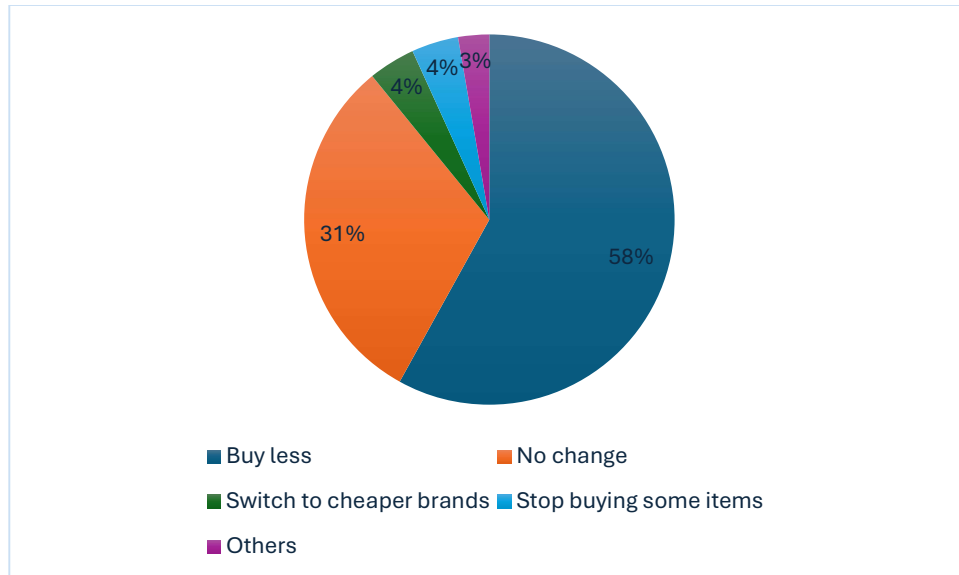


Figure 5: Youth Price Sensitivity to Dairy Price Increases

But the concern among older respondents is different; 46.7% said they are concerned about adulteration. This highlights that trust in product safety is a dominant issue for older consumers, even though they continue to buy dairy regularly. The results suggest that adulteration concerns have not reduced demand but rather drive preference for trusted outlets and brands.

Table 3: Adulteration Concerns among Adult Consumers (30+)

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		1	6.7	6.7	6.7
	Sometimes	7	46.7	46.7	53.3
	Yes	7	46.7	46.7	100.0
	Total	15	100.0	100.0	

And that might be the reason that Parents or Working Professional buyers reported diverse purchasing channels: 40% buy from local markets, 26.7% from direct farms, and 26.7% from well-known brand outlets. Only 6.7% reported no fixed preference. These results show that older buyers balance between accessibility (local market), reliability (brand), and personal trust (farm-direct). This mixed strategy reflects an adaptive approach to ensure household dairy supply in the face of price and quality concerns.

Table 4: Buying Preferences for Adult Consumers (Farm, Local Market, Brand Outlets)

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		1	6.7	6.7	6.7
	Direct from farms	4	26.7	26.7	33.3
	Local Market	6	40.0	40.0	73.3
	Well-known brands outlet	4	26.7	26.7	100.0
	Total	15	100.0	100.0	

Among our 74 youth respondents, 67.6% buy from local shops because it is the available common purchase channel. Then, Supermarkets (12.2%), farms (9.5%), and street vendors (6.8%) follow, with only 2.7% buying from other sources. This result highlights the dominance of local shops as the main distribution point for dairy products. Even though youth showed strong brand trust (e.g., Aarong), most actual buying still happens at local shops, suggesting a gap between brand preference and purchase channel. Consumers may want branded dairy, but accessibility and affordability drive them to local outlets instead.

Table 5: Consumer Purchase Places (Supermarkets, Local Shops, Street Vendors, Farms, Others)

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		1	1.4	1.4	1.4
	Supermarket	9	12.2	12.2	13.5
	Local shop	50	67.6	67.6	81.1
	Street vendor	5	6.8	6.8	87.8
	Direct from farms	7	9.5	9.5	97.3
	Others	2	2.7	2.7	100.0
	Total	74	100.0	100.0	

The Table below shows shopkeepers' observations of the best-selling dairy products. The data indicate that Aarong Liquid Milk (200 ml) and Farm Fresh Liquid Milk (200 ml) each accounted for 13.6% of sales, while Dano Powder Milk (small pack) represented 9.1%. Notably, yoghurt (per kg/cup) was the single most frequently sold product, making up 22.7% of sales. Smaller shares went to Aarong Butter (4.5%), Pran Lacchi (4.5%), Loose Milk (70–80 Tk/litre, 4.5%), and Mozzarella Cheese (4.5%). This pattern suggests that youth and everyday consumers buy dairy items to fulfil an immediate need for example,

purchasing small milk packs for tea or breakfast, or single portions of yoghurt for instant consumption. Products like Chess and butter are bought less frequently, highlighting that demand among younger buyers is driven by affordability, availability, and convenience, rather than stockpiling or long-term planning.

Table 6: Shopkeepers' observations on the best-selling product

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Arong Butter 200gm	1	4.5	4.5	18.2
	Aarong Liquid Milk 200ml	3	13.6	13.6	13.6
	Mozzarella Cheese	1	4.5	4.5	27.3
	Dano Powder Milk (Small Pack)	2	9.1	9.1	31.8
	Farm Fresh Liquid Milk 200ml	3	13.6	13.6	45.5
	Local Powdered Milk (Small Pack)	1	4.5	4.5	50.0
	Pran Lacchi	1	4.5	4.5	54.5
	Pran liquid Milk 200ml	2	9.1	9.1	63.6
	Loose Milk (70–80 Tk per litre)	1	4.5	4.5	72.7
	Yoghurt (per kg / per cup)	5	22.7	22.7	95.5
	Mixed/General Sales ("All kinds")	1	4.5	4.5-	100.0
	Total	22	100.0	100.0	

The clustered bar chart highlights the narrow price margins local shops earn on dairy products. For example, Aarong butter is purchased at Tk 195 and sold at Tk 200 (margin Tk 5), while Farm Fresh liquid milk is purchased around Tk 26–27 and sold at Tk 30 (margin Tk 3–4). Loose milk offers a wider gap of Tk 10 per litre (70 → 80), and yoghurt provides margins of Tk 20 per kg (240 → 260). This demonstrates that retailers depend on high sales volumes of packaged milk and yoghurt to sustain profits, as unit margins remain small across most products.

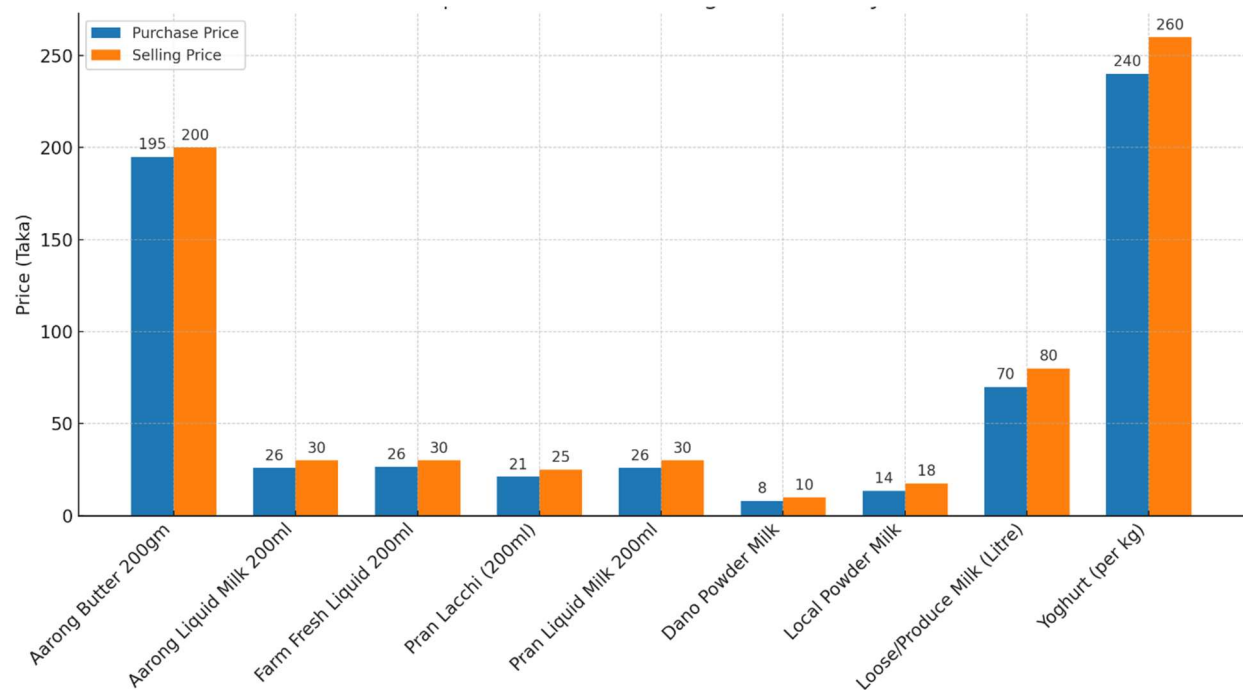


Figure 6: Local Shops – Purchase vs Selling Price of Dairy Products

We conducted two demographic surveys in Rajshahi, one in Rajshahi University and the Ruet area, where the main consumers are students, and in urban shops, where the main consumers are families. And their observation is shown below: 36.4% said they buy depending on money, while 31.8% purchase according to need, and 22.7% depending on quality. Only 9.1% said they consider all factors. This strongly aligns with both age groups of consumers' responses in other parts of the survey, suggesting a price–quality paradox: people know dairy is important, but reduce or delay purchase when costs rise.

Table 7: Consumer Purchase Modes (Money, Need, Quality, All Factors)

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Depending on money	8	36.4	36.4	36.4
	Depending on need	7	31.8	31.8	68.2
	Depends on quality	5	22.7	22.7	90.9
	Everything	2	9.1	9.1	100.0
	Total	22	100.0	100.0	

Influence on Purchase

Frequencies highlight that family tradition (37.8%) is the most influential factor shaping dairy purchases, followed by peer opinion (24.3%) and advertisements (13.5%). Doctor's advice (12.2%) and social media (8.1%) played smaller roles. This suggests that dairy buying is culturally embedded and socially reinforced, rather than strongly influenced by formal awareness campaigns or medical advice. It also reveals a research gap in promotional effectiveness — marketing efforts alone are unlikely to shift behaviour without addressing social and family traditions.

Table 8: Key Influences on Dairy Purchase Decisions among Youth

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		3	4.1	4.1	4.1
	Advertisements	10	13.5	13.5	17.6
	Doctor's advice	9	12.2	12.2	29.7
	Family tradition	28	37.8	37.8	67.6
	Social media	6	8.1	8.1	75.7
	Peer opinion	18	24.3	24.3	100.0
	Total	74	100.0	100.0	

And when we try to know about the family, we find most families are concerned about adulteration (mixing water or chemicals in milk). The survey below shows that almost all families are worried about adulteration in dairy products. Nearly half (46.7%) reported being regularly concerned, another 46.7% said they are sometimes concerned, while only 6.7% expressed no concern. This highlights that food safety and trust are major issues for parents and household decision-makers.

Table 9: Parents and Families concerned about adulteration.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		1	6.7	6.7	6.7
	Sometimes	7	46.7	46.7	53.3
	Yes	7	46.7	46.7	100.0
	Total	15	100.0	100.0	

As families always focus on purchasing based on quality And that's why they chose places where they trust the most as discussed in above. But some reported the availability is less nowadays and they that's why are shifting trust and brand preference. Like wise the survey on braand preference of of both

Table 10: Parents and Families' purchase preference

		Frequenc y	Percent	Valid Percent	Cumulative Percent
Valid		1	6.7	6.7	6.7
	Availabili ty	5	33.3	33.3	40.0
	Price	3	20.0	20.0	60.0
	Quality	6	40.0	40.0	100.0
	Total	15	100.0	100.0	

Also, this is supported by the frequency analysis on generational divide in brand loyalty. Among youth (18–30), 48.6% trust Aarong, followed by 23% trusting local vendors, while smaller proportions prefer Milk Vita (9.5%), Pran (9.5%), and Farm Fresh (5.4%). In contrast, the older group (30+) is more diversified: Milk Vita (26.7%), Aarong (20%), Farm Fresh (20%), Local vendors (20%), and Others (13.3%). These results indicate that youth demonstrate strong loyalty to well-known brands, particularly Aarong, while older

consumers spread trust across multiple brands. This reflects a market gap in consistent brand credibility across generations.

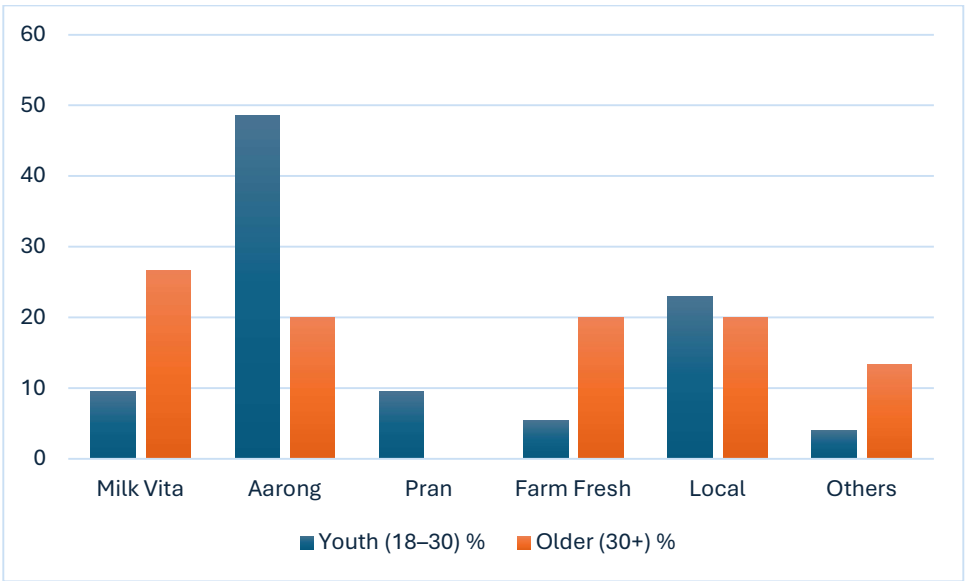
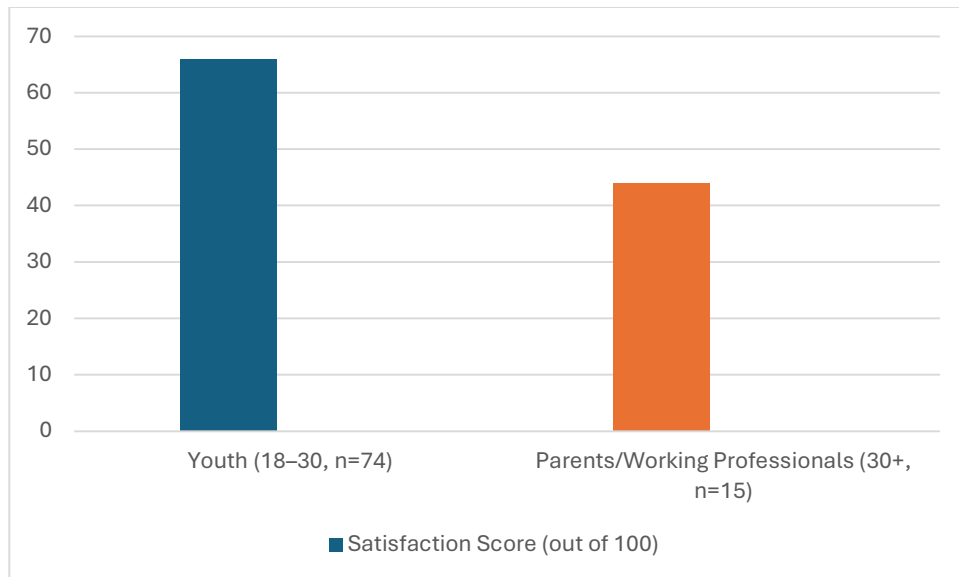


Figure 7: Brand Trust across Generations (Youth vs Adults)

The bar chart compares satisfaction levels between youth (18–30) and parents/working professionals (30+). The results show that youth report a moderately high satisfaction score of ≈66 out of 100, reflecting that they are relatively more positive about dairy consumption, though price remains a concern. In contrast, parents/working professionals show a much lower satisfaction score of ≈44 out of 100, indicating stronger dissatisfaction, mainly due to concerns about adulteration, product safety, and household affordability.



Middlemen/Distributors

Analysis shows that 72.7% of shopkeepers source dairy products through company distributors or middlemen, while 27.3% purchase them directly. This indicates a strong reliance on distributors for a consistent supply. However, such reliance reduces transparency, as most retailers cannot trace their products back to the original producers, instead relying on the brand's reputation. This represents a supply chain gap in traceability, which may increase consumer mistrust in product authenticity.

Table 11: Regarding the question on Distributors/Middlemen

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	no	6	27.3	27.3	27.3
	yes	16	72.7	72.7	100.0
	Total	22	100.0	100.0	

When asked whether they knew their producers, 59.1% of retailers responded “No”, compared to only 40.9% who said “Yes.” This finding complements the previous result: most retailers depend on distributors without knowing the actual source of products. From a consumer trust perspective, this is critical since even retailers cannot vouch for the producer, consumers are forced to rely purely on brand image, not verified transparency. This represents a major gap in producer traceability and consumer confidence.

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Volume 16, Issue 01, 127-156. 10-10-25 ISSN: 2617-7420 (Print), 2617-7420 (Online)

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Table 12: Retailers' Knowledge of Producers (Traceability of Supply Sources)

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	no	13	59.1	59.1	59.1
	yes	9	40.9	40.9	100.0
	Total	22	100.0	100.0	

Farm/supplier cost management & profit margins

Production and Sales (Farms/Suppliers/Ghosh)

The bar chart comparing production and sales shows that both Ghosh/ suppliers (20–150 L/day) and farms (100–300 L/day) sell slightly less than they produce, reflecting losses from spoilage, storage, or transport inefficiencies. While farms operate on a larger scale, the pattern of production being higher than actual sales is consistent across both groups. These highlights supply chain inefficiencies in the first-mile transport and cooling stage.

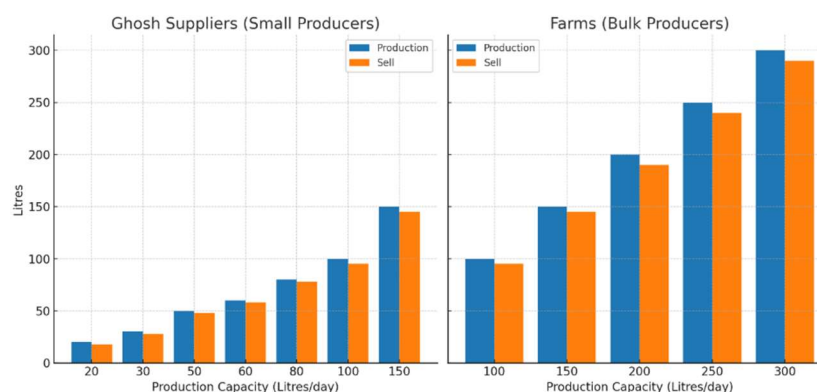


Figure 8: Production vs Sales of Milk — Ghosh Suppliers (Small Producers) vs Farms (Bulk Producers)

The combined data from suppliers and farms reveal a fragmented but locally dominated milk market. The largest share of milk buyers consists of local shops, wholesalers, milk collectors, and villagers, accounting for 33.3% of the total market. Dairy companies and processing institutes represent the second-largest segment (25%), reflecting the growing role of formal processing channels. Neighbor-to-neighbor exchanges and villager buyers together account for about 25%, highlighting the continued significance of informal networks in rural communities. Meanwhile, big branded milk companies capture only

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8.3%, indicating that formal branded supply chains have yet to penetrate deeply at the producer–buyer level.

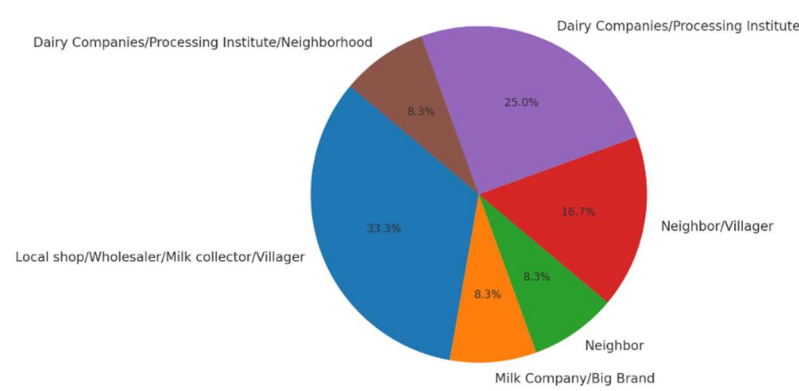


Figure 9: Market Share of Milk Buyers

The frequency chart shows that the major consumer complaints reported by shopkeepers are adulteration (37.5%), supply shortages (25%), and overpricing (25%), while hygiene concerns (12.5%) were less frequent. This indicates that quality assurance and availability are the most pressing issues affecting consumer trust in the dairy market.

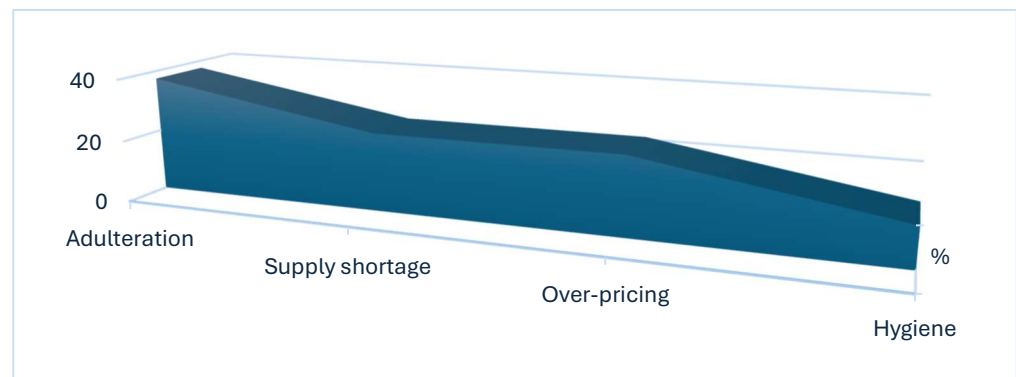


Figure 10: Major Consumer Complaints about Dairy Products (Adulteration, Supply Shortage, Overpricing, Hygiene)

When suppliers were asked whether they or others engaged in adulteration, 37.5% admitted it happens sometimes, and 12.5% said many times, while 25% denied it and 25% preferred not to say. These findings suggest that adulteration, while not universally acknowledged, is a recognised practice under pressure to meet demand or prolong shelf-

life. This validates consumers’ mistrust and reflects a serious gap in quality control enforcement.

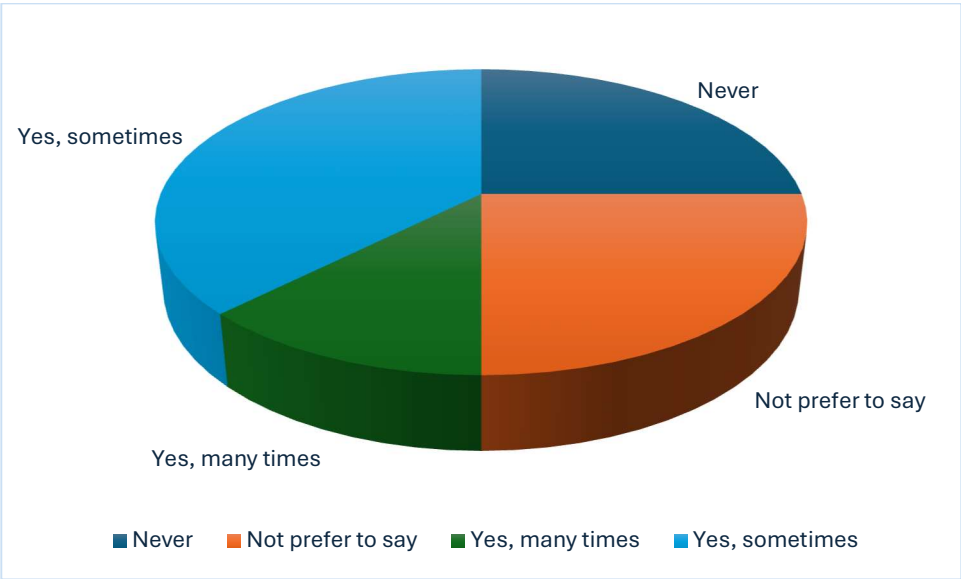


Figure 11: Supplier Admissions of Adulteration Practices

When asked about milk pricing, farms reported a wide range in wholesale and retail rates. A small portion (12.5%) shared prices around 55–60 taka per litre at wholesale (≈70–801 retail). However, most farms indicated retail prices clustered between 75 and 80 taka per litre (each 37.5%). This shows that while some lower-price transactions exist, the prevailing farm-level retail price lies in the 70–80-taka range.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	55-taka wholesale - 80 retail	1	12.5	12.5	12.5
	60 Taka wholesale 70-80 Taka retail	1	12.5	12.5	25.0
	75	3	37.5	37.5	62.5
	80	3	37.5	37.5	100.0
	Total	8	100.0	100.0	

And when asked about whether they think price is fair or not, Farmers’ views on milk pricing were divided; 37.5% said current prices are too low, another 37.5% said prices need to increase, while only 12.5% said prices are fair, and 12.5% described them as

moderate. This indicates that most producers feel undervalued in the market, with dissatisfaction stemming from the imbalance between high production costs and the relatively low farm-gate price.

Table 13: Suppliers' Opinions on Milk Prices (Fair, Moderate, Too Low, Needs Increase)

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Fair	1	12.5	12.5	12.5
	Moderate	1	12.5	12.5	25.0
	Too low	3	37.5	37.5	62.5
	Needs increase to	3	37.5	37.5	100.0
	Total	8	100.0	100.0	

Situation and Decision Analysis of Farmers

The responses from dairy suppliers highlight the fragile financial situation of small producers. A majority (62.5%) reported making only a small profit, while 12.5% admitted experiencing losses and another 12.5% stated there was almost no profit. Only one respondent (12.5%) indicated earning enough profit to sustain operations. Overall, these results suggest that most suppliers operate with very narrow margins, leaving them vulnerable to rising input costs and price fluctuations in the dairy market.

Table 14: Suppliers' Opinions on Profitability of Their Dairy Business

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Damage is occurring	1	12.5	12.5	12.5
	Making a small profit	5	62.5	62.5	75.0
	There is almost no profit	1	12.5	12.5	87.5
	Yes, there is enough profit	1	12.5	12.5	100.0
	Total	8	100.0	100.0	

When asked about the main challenges in their business, half of the respondents (50%) identified high cow feed cost as their most pressing problem. Another 37.5% pointed to low milk prices, which reduce profitability despite high production costs. A smaller proportion (12.5%) mentioned other issues, such as family labour shortages or local constraints. These findings confirm that the combination of rising feed expenses and

suppressed farm-gate prices represents the most critical barrier to profitability and sustainability for small dairy producers.

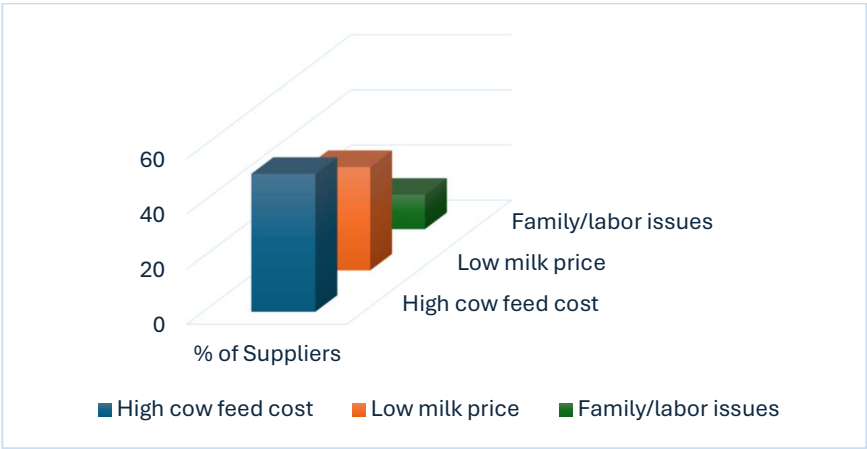


Figure 12: Supplier/Ghosh/Farms Identified Problems in Dairy Production (High Feed Cost, Low Milk Price, Family/Labor Issues)

Cost distribution analysis shows that feed accounts for about 55% of total costs, followed by maintenance (25%), veterinary care (10%), and transport (10%). This confirms that feed is the dominant cost driver, consuming over half of total production expenses. The heavy burden of feed cost, combined with only modest profit margins, highlights a critical research gap in cost efficiency and the need for interventions such as fodder subsidies or silage promotion.

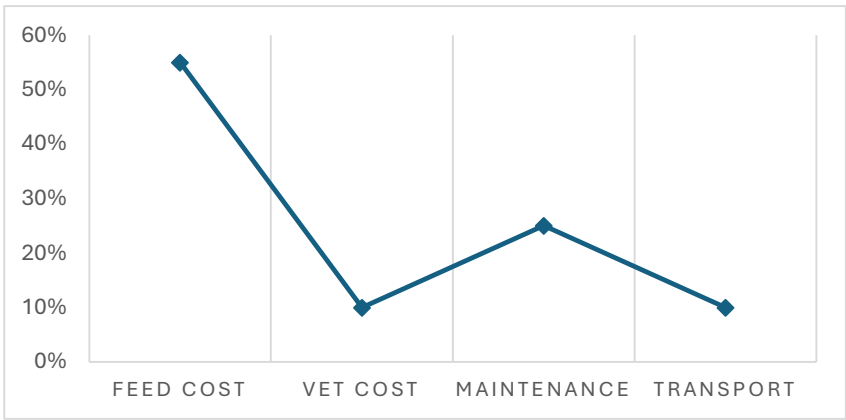


Figure 13: Cost Distribution of Dairy Farming (Feed, Veterinary, Maintenance, Transport)

Among the farms surveyed, 50% reported using chiller machines, while 50% relied on local procedures. This indicates that half of producers still lack proper cold-chain infrastructure, which risks quality deterioration during transport. The split adoption reflects an infrastructure gap in first-mile logistics, where quality assurance remains uneven.

Table 15: Use of Chilling Machines vs Local Procedures in Milk Transport

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Chiller Machine	2	50.0	50.0	50.0
	Local Procedures	2	50.0	50.0	100.0
	Total	4	100.0	100.0	

When asked if milk prices should increase, responses were evenly split: 50% said yes, while 50% said it should depend on the situation. This reflects farmers' uncertainty. While they acknowledge the need for higher prices to cover costs, they are also aware of consumer sensitivity to price hikes. The result points to a market tension between farmer survival and consumer affordability.

Table 16: Use of Chilling Machines vs Local Procedures in Milk Transport

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	According to the situation	4	50.0	50.0	50.0
	Yes	4	50.0	50.0	100.0
	Total	8	100.0	100.0	

Comparative Case of Northern Belt vs. Bangladesh

The northern dairy belt of Bangladesh benefits from abundant fodder and effective development initiatives, particularly in Sirajganj and Pabna, which together produce nearly half the nation's milk. This region's clustered farming systems and chilling infrastructures, established by major processors like Milk Vita and BRAC Dairy, support efficient milk collection and distribution. As a result, production is both consistent and

increasingly modernised, strengthening the local dairy value chain. These structural advantages elevate the region's role in Bangladesh's dairy sector (Muzareba, 2021).

Bangladesh's northern milk belt (Sirajganj–Pabna–Bogura–Rajshahi) enjoys clear structural advantages: abundant fodder, dense farm clusters, and established collection routes; nearly half of the country's milk is produced in Sirajganj and Pabna alone, and national output still meets only about two-thirds of demand (≈ 165 ml/person/day vs a 250 ml target) (Netherlands Enterprise Agency (RVO), 2023). In parallel, the formal, processed channel captures only about 5–7% of milk while the rest flows through informal retail—where adulteration remains a documented concern—constraining quality signalling and price differentiation by origin (Netherlands Enterprise Agency (RVO), 2023). At the retail end, brands move with uniform MRPs nationwide (e.g., the Tk 10/litre hike in March–April 2025), effectively flattening regional cost advantages in consumer prices (The Daily Star, 2025; bdnews24.com, 2025).

Against this backdrop, our findings explain why northern advantages fail to translate at the counter. First, price pass-through is weak: local shops buy loose milk at $\approx$ Tk 70/L and sell $\approx$ Tk 80/L—thin per-unit margins that leave little room to reflect cheaper northern supply. Second, first-mile quality is uneven: only about half of farms report using chillers, and both Ghosh and farms sell slightly less than they produce, consistent with spoilage/handling losses; these realities mirror national concerns about quality control in informal channels. (Netherlands Enterprise Agency (RVO), 2023). Third, trust frictions persist: consumer complaints centre on adulteration, and suppliers themselves acknowledge it “sometimes” or “many times,” pushing families to pay brand MRPs for perceived safety even in surplus zones. Lastly, demand heterogeneity blunts scale gains: youth are price-elastic and brand-loyal in pockets, while older buyers spread purchases across outlets, so processors cannot leverage northern scale to unify national demand.

Bottom line is, despite the north's production ease and lower upstream costs, uniform MRPs, partial cold-chain adoption, adulteration/traceability gaps, and distributor-led flows

keep market outcomes in the north remarkably like the national pattern. (Netherlands Enterprise Agency (RVO), 2023; The Daily Star, 2025; bdnews24.com, 2025).

Recommendations

Strengthen Cold-Chain Infrastructure

Only half of the surveyed farms reported using chillers, leaving quality vulnerable during first-mile transport. Investment in village-level chilling centres, insulated transport, and cooperative-owned cold storage is essential to reduce spoilage and improve consumer trust in milk safety. Public–private partnerships could expand access to low-cost chilling technology in surplus regions.

Address the Feed Cost Burden

Feed constitutes nearly 55% of farm costs, making it the single greatest barrier to profitability. To ease pressure on smallholders, fodder subsidies, silage adoption, and locally sourced feed production should be promoted. Government and NGOs can support farmer training in cost-efficient feed practices and strengthen input supply chains.

Ensure Fair Farm-Gate Pricing

Most farmers reported dissatisfaction with milk prices, with 75% saying current levels are “too low” or “need to increase.” At the same time, consumers remain price sensitive. A solution lies in transparent, region-sensitive pricing mechanisms that balance producer survival with affordability. Dairy cooperatives should be empowered to negotiate prices directly with processors and distributors, ensuring fairer margins at the producer level.

Improve Traceability and Quality Assurance

Over 70% of shopkeepers depend on distributors, and 59% admit they cannot identify the actual producer. This lack of traceability fuels consumer mistrust and perpetuates adulteration. Implementation of QR codes, digital tracking, and source labelling at the

retail level would allow consumers to verify origin. Stronger regulatory monitoring and food safety enforcement are also critical to curbing adulteration.

Rebuild Consumer Trust through Ethical and Transparent Practices

Both youth and adult consumers highlighted adulteration concerns, with older buyers adapting by relying on trusted outlets. To close the trust gap, processors and regulators should promote transparent testing, third-party certification, and ethical farming standards. Farmers also need support in improving cow treatment and adopting better veterinary practices, which can serve as a marketing advantage in premium segments.

Target Consumer Segments Differently

Youth respondents showed high awareness of dairy's health value (90.5% agree it is essential) but weak daily consumption (only 6.8% consume daily), mostly due to price sensitivity. Meanwhile, adults maintain a stronger daily intake but demand assurance of quality. Campaigns should therefore be dual-pronged:

- **For youth:** affordability schemes (student discounts, small affordable packs).
- **For adults:** assurance programs (traceability, hygiene certification, loyalty schemes with trusted outlets).

Promote Cooperative and Cluster-Based Models in the Northern Belt

The northern region produces nearly half of Bangladesh's milk but fails to pass cost advantages to consumers due to uniform MRPs and distributor dominance. Building farmer cooperatives and cluster-based collection networks can shorten the chain, reduce dependence on middlemen, and increase farmer margins. This would also allow surplus zones like Rajshahi to develop as regional dairy hubs.

Policy Interventions for Balanced Growth

- Introduce region-specific MRPs or flexible pricing bands that reflect local production realities.

- Incentivise investment in cold-chain and input supply infrastructure in surplus-producing regions.
- Enforce stricter anti-adulteration penalties and quality standards across informal channels, where 80% of milk currently flows.
- Support youth-focused entrepreneurship in dairy marketing and distribution, linking nutrition awareness with affordable supply.

Study Limitations

This study is limited by its focus on the Rajshahi division, which, while a critical part of the northern dairy belt, may not represent the full diversity of Bangladesh's dairy market. The sample size, particularly among parents ($n = 15$) and farms ($n = 4$), was relatively small, and findings rely on respondents' comments and perceptions, which are subject to bias. Additionally, data were collected over a short period (July–August 2025), restricting the ability to capture seasonal or long-term market fluctuations. These limitations suggest caution in generalizing the results nationally, though the insights remain valuable for understanding the regional dynamics of the dairy supply chain.

Conclusion

This study set out to examine the structure and dynamics of the dairy supply chain in Rajshahi, a region within Bangladesh's northern milk belt that holds clear production advantages but continues to mirror national inefficiencies. The findings show that farmers face disproportionately high feed costs ($\approx 55\%$ of total expenses) while receiving low farm-gate prices, leaving most with narrow profit margins or near losses. At the distribution level, middlemen and company distributors dominate flows, with over 70% of retailers sourcing through them and 59% unable to trace their actual producers. This heavy reliance on intermediaries weakens transparency and erodes consumer trust.

On the demand side, consumer behaviour reflects a trust–price paradox. Youth consumers, though highly aware of dairy's nutritional value, remain strongly price-sensitive and reduce purchases when costs rise. Parents and working professionals, meanwhile, maintain steady consumption but identify adulteration as their primary

concern, relying on brand reputation or trusted outlets rather than verified traceability. Retailers, squeezed between high procurement costs and low margins, report adulteration, supply shortages, and overpricing as the major consumer complaints.

Comparative evidence with the broader northern belt shows that Rajshahi's situation is not isolated. Despite its surplus production capacity and established collection routes, regional advantages are not reflected in consumer affordability or farmer profitability because of uniform MRPs, weak cold-chain infrastructure, and limited producer visibility.

Therefore, the study concludes that without systemic reforms, Rajshahi's dairy sector will remain locked in a cycle where farmers are undervalued, retailers depend on distributors, and consumers lack confidence in quality and fairness. Addressing this requires multi-level interventions: fairer region-sensitive pricing mechanisms, investment in cold-chain and feed efficiency, stronger traceability frameworks, and cooperative models that empower farmers. Only by integrating these solutions can the northern belt's natural advantages be translated into a more equitable and sustainable dairy market for Bangladesh.

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