

Turning *mattha* into money: Enhancing income of ghee-producing dairy farmers through raw casein production from buttermilk

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Dairying is central to rural livelihoods in Madhya Pradesh, with Morena district ranking first in milk production. Given challenges of soil erosion and low crop yields, livestock especially dairying, provides a crucial source of income and nutrition. To address marketing constraints of milk, farmers traditionally process it into ghee and khoa. Recently, they have innovatively begun converting buttermilk, a by-product of ghee, into raw casein, creating an additional revenue stream. This article provides details of two production methods on casein extraction. On average, raw casein contains 56.5% protein, 20% fat, 12.5% moisture, and 7.5% ash. By converting milk and by-products into ghee and casein, farmers earn 20–25% higher returns, highlighting the potential of value addition to strengthen rural dairy economies.

Keywords: Buttermilk, Casein extraction, Economics, Livelihood, Value addition

LIVESTOCK production, particularly dairying, plays a pivotal role in sustaining rural livelihoods in India, contributing significantly to food security, household income, and employment generation. Within this framework, the state of Madhya Pradesh holds a prominent position, with Morena district ranking first in milk production. According to official statistics, Morena district produced approximately 914.49 tonnes of milk during 2021-22 (Department of Animal Husbandry, Govt. of Madhya Pradesh 2022-23). This substantial output underscores the centrality of dairy farming in the region's rural economy.

Agriculture in Morena, however, faces persistent structural and environmental challenges. The district is prone to severe soil erosion caused by multiple river systems traversing the landscape, leading to poor soil fertility and reduced crop yields. As a result, crop

farming alone often fails to ensure sustainable livelihoods, particularly for small and marginal farmers who constitute the majority of the agrarian population. These households therefore rely heavily on animal husbandry, primarily dairying, not only as a supplementary occupation but as a primary source of cash income and nutritional security. To get good profit with constraints of limited market access and infrastructure, farmers in Morena have adopted traditional practices of converting milk into value-added dairy products. The most common among these are khoa/mawa (produced mainly during festivals and ceremonial seasons) and ghee, which remains a year-round processing activity. Such value addition enables farmers to overcome challenges related to low local consumption of milk and absence of organised milk collection routes.

In recent years, a distinctive

development has been made in utilisation of buttermilk (*mattha*), a by-product of ghee production. Traditionally, *mattha* was either used as animal feed or consumed in small quantities within households. However, farmers in Morena district have innovatively learned to convert *mattha* into raw casein, thereby creating a new revenue stream from an otherwise underutilised by-product. This practice aligns with broader trends in India, where by-product utilisation and diversification into high-value dairy derivatives have emerged as strategies to enhance rural income and resource efficiency. The raw casein produced or finished casein is used for industrial purpose, so it is not for human consumption like food grade cheese/paneer. Thus, Morena presents a unique case of how smallholder dairy farmers adapt traditional processing practices to local resource constraints and market opportunities. By transforming



Raw casein

composition of raw casein (adapted from field survey) contains

- Protein: 56.5%
- Fat: 20.0%
- Moisture: 12.5%
- Ash: 7.5%
- Other impurities: 3.5%

Partial processing of casein

One major trader in Morena partially processes raw casein. After sun-drying for 3–4 days, machines are used to reduce fat, ash, and impurities followed by additional drying. The partially processed casein shows higher protein (70%) and lower fat content (10%) compared to raw casein. After partial processing of raw casein through machine, there is recovery of 10–12% of poor quality fat which is sold to different soap manufactures in adjoining areas of Uttar Pradesh.

Industry/Channels for buying raw and processed casein

The processing of raw casein into finished casein business is recently started in Morena. They purchase the raw casein from farmers of different states. The estimated current processing capacity of them is more than 1,500–1,800 tonnes annually and there is huge potential demand for raw casein beyond 4,000–5,000 tonnes per year. The biggest purchaser of raw casein is Shagun Proteins Private Limited (Parsuram Nagar, Bypass road, Morena, M.P.) of Sri Neeraj Modi. It has 50 percent share in total processing of raw casein by



Extraction plant

surplus milk and by-products into durable, higher-value commodities such as ghee and casein, farmers are not only improving their household incomes but also contributing to sustainable rural development and resilience of the dairy economy.

Methods adopted for casein production

Following two main methods are adopted by farmers in converting *mattha* into raw casein:

Cloth/Bag filtration method: *Mattha* is poured into muslin cloth or jute bags to drain water. The retained solids are sun-dried on cloth or polythene sheets, yielding raw casein in the form of larger granules. This method offers slightly higher recovery but lower purity.

Coagulation method: *Mattha* is either heated or treated with alum (*phitkari*) or citric acid (*tatri*), leading

to coagulation of casein into small solid particles. After draining, the material is sun-dried to obtain casein granules of superior quality, as lactose and impurities are better separated.

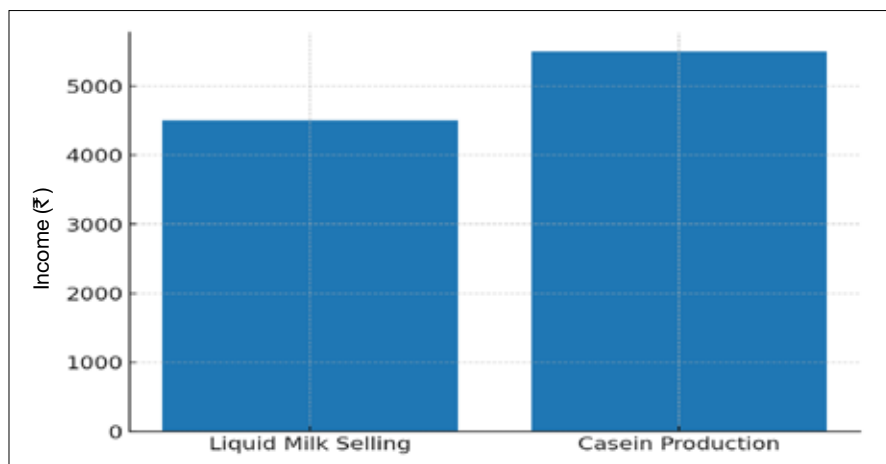
Raw casein market provides the extra opportunity to get the income from butter milk and selling the raw casein to processing plant. The individual farmers are required to produce raw casein by drying the butter milk by sun drying method only. The fat and oil extraction from raw casein is to be done by processing plants by high tech machines. Farmer does not produce the skim milk. The cost of setting the extraction/processing plant is very high for farmers. It requires huge capital approximately around ₹2–2.5 crores and high expertise. During the purification of raw casein, it is first converted in liquid form and then impurities are removed that requires hydrolic, chemical and mechanical processes.

Physical and chemical properties of raw casein

Drying time varies from 3 days in winter to 1.5 days in summer. Casein from the first method is yellowish with larger granules, while casein from coagulation is finer, off-white to light brown. The chemical composition is relatively consistent, with some differences in sugar content. The average



Recovered fat from casein



Farmers income from milk and casein production

₹50 for drying *matha* = ₹500

- Total returns from ghee only = ₹5,000
- Total return from ghee and raw casein; ₹5,000 + ₹500 = ₹5,500

In contrast, selling 100 L of milk directly yields ₹4,500 (at ₹45/L). Thus, value addition through ghee and casein provides a 20–25% income advantage. The better the quality of raw casein, the better will be the price the farmers get ranging from ₹80–120/kg.

SUMMARY

Casein production from *mattha* is emerging as a significant rural enterprise in Morena district. With 120–160 tonnes of casein traded monthly at ₹100/kg, the local casein market is worth ₹72–96 lakhs per month. For remote areas where milk marketing is a challenge, ghee combined with raw casein production offers a sustainable alternative. Development of mechanical cream separators for efficient fat removal can further enhance ghee yield and improve casein quality. Similar technological interventions and cooperative support could significantly strengthen rural dairy economies.

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all firms in the area. The raw casein provided by farmers is further processed by processors with high tech machines and will be used for industrial purposes such as crackers, matchboxes, lubricants, paints, etc. It is used mostly as binding agent and not for human consumption. Hence, FSSAI standards are not applicable in raw casein. While purchasing, the trader judges the quality of raw casein on the basis of colour, texture and smell.

Market potential and marketing

In Morena district, an estimated 120–150 tonnes of raw casein is traded monthly, with higher volumes in winter. Average retail prices are about ₹100/kg, similar to reported casein prices in Indian rural

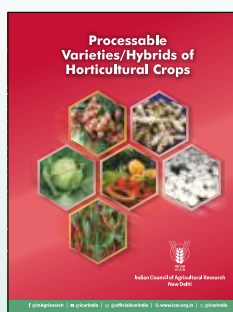
markets. Farmers sell casein directly to city traders or to local agents who collect door-to-door. At present, 5–6 major traders operate in Morena, of which only one is engaged in partial processing. The bulk of raw casein is transported to Anand, Gujarat, where it is processed for use in paint, pharmaceuticals, cosmetics, leather finishing, textile auxiliary, paper sizing, glue and match industries.

Economics of casein production

If 100 L of milk is converted into ghee and raw casein:

- Income from only ghee making = 5 kg sells at ₹1,000/kg = ₹5,000
- Total butter milk produced from 100 L ghee processing: 95 L
- By-product raw casein yield = 5.5 kg sells at ₹100/kg; ₹550 -

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