AUCTORES
Globalize your Research

Journal of Nutrition and Food Processing

Mahendra Pal*

Open Access

Review Article

Value Added Dairy Products from Goat Milk

Mahendra Pal [1]*, Suneeta Pinto [2], Ranjeet Parihar [3]

[1]Narayan Consultancy of Veterinary Public Health, and Microbiology, Bharuch, Gujarat, India

[2]Department of Dairy Technology, College of Dairy Science, Anand, Gujarat, India

[3]Government Veterinary Hospital, Mundara, Bali, Pali, Rajasthan, India

Corresponding author: Mahendra Pal, Professor, Managing Director of Narayan Consultancy on Veterinary Public Health and Microbiology, B-103, Sapphire Lifestyle, Bharuch, Gujarat, India.

Received date: March 10, 2025; **Accepted date:** March 25, 2025; **Published date:** March 30, 2025

Citation: Mahendra Pal., Suneeta Pinto, Ranjeet Parihar, (2026), Value Added Dairy Products from Goat Milk, *J. Nutrition and Food Processing,* 9(2); **DOI:10.31579/2637-8914/357**

Abstract:

Milk and dairy products constitute a fundamental component of the human diet, and are consumed across all age groups, by both sexes, and throughout all seasons worldwide. Milk is derived from a diverse range of animal species, including cows, buffaloes, goats, camels, sheep, donkeys, and yaks. Many types of dairy products are produced from the milk. The butter, cheese, yoghurt, and milk powder are consumed globally. The goat is frequently referred to as the "poor man's cow," as it is predominantly reared by resource-limited smallholder farmers. The highest goat populations are concentrated in Africa and Asia. In recent years, goat milk has attracted considerable global attention owing to its distinctive nutritional, functional, and therapeutic attributes. In comparison with bovine milk, goat milk exhibits superior digestibility, characterized by smaller fat globules, reduced αs1-casein content, and elevated concentrations of short- and medium-chain fatty acids. These compositional features render goat milk particularly suitable for infants, elderly individuals, and persons exhibiting intolerance to cow milk. A broad spectrum of value-added products can be manufactured from goat milk, including cheese, butter, yoghurt, kefir, ghee (butter oil), infant formula, and traditional Indian dairy-based confections, such as Shrikhand, Rasgulla, and Sandesh etc. Value addition not only prolongs shelf life and enhances economic returns but also facilitates product diversification to meet the growing consumer demand for functional and health-promoting foods.

Key words: fermented foods; functional foods; cheese; goat milk; value added dairy products; yoghurt

1.Introduction

Milk is a fresh, white liquid that is produced by the lactating animals chiefly from cows, buffaloes, goats, and sheep; and serve as an important source of macro-nutrients as well as micronutrients to maintain good health [1]. It is mentioned that cow milk is globally used but the milk obtained from other species of animals, such as buffaloes, goats, camels, donkeys, sheep, yaks, and Mithuns are also consumed in several regions of the world [2, 1]. Goat milk production constitutes a vital component of the livelihood strategies of small and marginal farmers, particularly in developing countries. Goats exhibit remarkable adaptability to harsh climatic conditions and require relatively minimal inputs, rendering them highly suitable dairy animals for resource-constrained regions [3]. Nevertheless, despite considerable levels of goat milk production, its transformation into value-added products remains limited in many parts of the world.

Value addition denotes the conversion of raw agricultural commodities into processed products characterized by enhanced quality, consumer acceptability, extended shelf life, and greater market value. In the context of goat milk, value addition presents significant opportunities for product diversification, augmentation of farmers' income, and expansion into niche markets emphasizing health, nutrition, and specialty dairy products [4].

This article provides an over review of various value-added dairy products derived from goat milk, including fermented products, cheeses, beverages, milk powders, traditional sweets, and functional foods.

2. Nutritional and functional attributes of goat milk

Goat milk is recognized for its superior nutritional profile, comprising high-quality proteins, essential fatty acids, vitamins, and minerals. It contains comparatively higher concentrations of calcium, phosphorus, potassium, and magnesium than cow milk [5]. Furthermore, the generation of bioactive peptides during digestion and fermentation enhances its functional properties and contributes to its health-promoting effects. The hypoallergenic properties of goat milk are primarily associated with its reduced αs1-casein content, which enhances its suitability for individuals affected by cow milk protein allergy [6]. Moreover, the lipid fraction of goat milk is enriched with medium-chain triglycerides that are rapidly metabolized, thereby facilitating efficient energy utilization.

3. Need for value addition of goat milk

The inherent perishability of raw goat milk necessitates its conversion into stable and diversified value-added products. Such processing

strategies effectively reduce post-harvest losses, prolong shelf life, and improve economic returns for both farmers and dairy processors [7]. Furthermore, value-added goat milk products often fetch premium prices in health-focused and specialty food markets, thereby enhancing their commercial viability.

4. Fermented milk products

4.1 Goat Milk Yogurt

Yoghurt is a fermented dairy product, which is a natural source of probiotics [8]. It is consumed globally, and is a good source of protein, minerals, and vitamins [8]. Goat milk yogurt is produced using starter cultures, such as *Lactobacillus delbrueckii* subsp. *bulgaricus* and *Streptococcus thermophilus*. Although goat milk yogurt typically exhibits a comparatively weaker gel structure, its enhanced digestibility and favorable nutritional attributes contribute to its growing popularity among consumers [9]. Concentrated yogurt (Labneh) was produced using goat's milk, cow's milk, and a combination of both. Among the evaluated formulations, the blend comprising 40% goat's milk and 60% cow's milk received the highest sensory scores from the evaluation panel [10].

4.2 Probiotic and Cultured Beverages

Incorporation of probiotic strains such as *Lactobacillus acidophilus* and *Bifidobacterium* spp. enhances the functional value of fermented goat milk. Regular intake of probiotic goat milk products has been linked to enhanced gastrointestinal health and modulation of immune function [11]. Kishk is a traditional fermented dairy product consisting of a dried blend of yogurt and bulgur, typically prepared using goat milk [12].

5. Cheese

Cheese a fermented milk product, which contains protein, fat, calcium, phosphorus, riboflavin and other vitamins [13]. Many varieties of cheese are available. Cheese represents one of the most significant value-added products derived from goat milk, encompassing a wide spectrum from fresh soft varieties to extensively ripened types. Soft cheeses, such as chèvre, are highly valued for their distinctive flavour and desirable spread ability. In contrast, ripened goat milk cheeses develop complex sensory characteristics as a result of biochemical processes, particularly proteolysis and lipolysis, occurring during maturation [14]. Ricotta is a kind of cheese which may be made from goat cheese whey [15]. Broccio is a traditional whey cheese produced by blending goat milk with whey obtained from goat cheese manufacture [16]. Litopoulou and Tzanetakis [19] developed a white brined cheese from raw caprine milk and investigated its microbiological changes during ripening. Over a 90-day maturation period, dynamic microbial activity was observed, with lactic acid bacteria becoming predominant after 15 days. By the 75th day, the combined effects of low pH and elevated salt concentration led to a reduction in overall microbial counts, with *Lactobacillus plantarum*, *Lactococcus lactis* subsp. *lactis*, and *Enterococcus faecium* emerging as the dominant species. Furthermore, Deshwal and co-workers [18] reported the production of Halloumi-type cheese from goat milk using ultrafiltration, highlighting its potential to enhance both yield and product quality.

6. Butter and ghee

Butter is considered as one of the most ancient dairy products, and is a rich source of fat. Butter and ghee derived from goat milk are highly valued for their distinctive aroma and enhanced digestibility. Goat milk ghee is characterized by a higher proportion of short-chain fatty acids, which facilitate rapid energy release and contribute to improved lipid metabolism [4].

7. Milk powder and infant foods

Goat milk powder produced through spray drying is extensively utilized in infant formula and nutritional supplements owing to its superior solubility and enhanced digestibility. Numerous studies have underscored the suitability of goat milk-based formulations for infants [19]. Reddy and others [20] optimized the processing conditions for manufacture of spray dried Osmanabadi goat milk powder.

8. Traditional sweets and confectionery

In India, about 40 to 50 percent of total milk produced is converted to manufacture traditional dairy products by using several techniques [2]. People in India are very fond of consuming a wide variety of milk products, such as burfi, shrikhand, paneer, khoa, rasgulla, basundi, kheer, peda, kulfi gulabjamun, channa, rabri, etc [21]. Goat milk is widely utilized in the preparation of traditional dairy products, such as khoa, peda, burfi, and kheer. The standardization of processing techniques, coupled with advancements in packaging, can substantially improve the shelf life, and marketability of these products [7].

Goat milk with 3 to 4% fat can thus be utilized successfully for preparing chhana suitable for rasgulla making [22]. Mishra and co-workers [23] developed a method for producing goat milk rasgulla of acceptable quality by incorporating whey protein concentrate (WPC) as a functional additive. In their comparative evaluation of chhana derived from cow and goat milk, no significant differences ($P > 0.05$) were observed in textural attributes such as cohesiveness, springiness, gumminess, chewiness, and adhesiveness. However, the hardness of goat milk chhana was found to be significantly higher ($P < 0.01$) than that of cow milk rasgulla. Cajeta is a traditional Mexican confection prepared from goat milk, characterized as a rich caramelized sauce [24]. Additionally, the incorporation of lotus seed powder has been shown to enhance both the nutritional value and sensory attributes of goat milk-based chocolate frozen yogurt [25].

9. Ice cream

Ice cream, a globally consumed frozen desert, contains protein, fat, vitamins, and minerals [26]. Ice cream produced from goat milk has been reported to be the most acceptable among different milk types, followed by cow milk, whereas sheep milk ice cream is comparatively less preferred [27]. Furthermore, goat milk ice cream is characterized by a softer texture and unique melting properties when compared to ice cream derived from cow milk [27]. Ranadheera and co-investigators [28] have developed a process for the production of chocolate-flavored, goat milk-based probiotic ice cream of acceptable quality, incorporating probiotic strains such as *Lactobacillus acidophilus* LA-5, *Bifidobacterium animalis* subsp. *lactis* BB-12, and *Propionibacterium jensenii*.

10. Functional and therapeutic products

Goat milk serves as an excellent substrate for the development of functional foods enriched with probiotics, prebiotics, and essential micronutrients. Therapeutic goat milk-based products are often recommended for elderly individuals, convalescent patients, and those suffering from digestive and metabolic disorders [5]. Various milk protein–based ingredients, including whey protein concentrate (WPC), whey protein isolate (WPI), sodium caseinate (NaCn), and goat skimmed milk powder, have been employed in the manufacture of goat milk (GM) yogurt. Among the different formulations, yogurts fortified with sodium caseinate were found to be the most acceptable based on sensory evaluation by the panel [29].

11. Challenges and future prospects

The major constraints associated with value addition in goat milk include inadequate organized processing infrastructure, the absence of standardized technologies, and limited consumer awareness. Addressing these challenges will require strengthened research initiatives, effective extension services, and supportive policy frameworks to fully realize the potential of goat milk-based products.

12. Conclusion

Milk and dairy products are used since antiquity. A wide range of value-added products, spanning conventional dairy items to functional foods,

are derived from goat milk and are utilized globally. These value-added dairy products offer significant potential for improving human nutrition, augmenting farmers' income, and promoting sustainable dairy development. Moreover, fermented products, cheeses, milk powders, and functional foods derived from goat milk exhibit distinctive nutritional and therapeutic benefits. It is emphasized that further efforts on processing, quality assurance, and market development are vital for the future growth of value- added dairy products from goat milk. The education of food handlers on the principles of milk hygiene is highly imperative to produce excellent quality of dairy products from food safety point of view.

Acknowledgements

We are very grateful to Prof. Dr. R. K. Narayan for giving his critical comments during the preparation of the manuscript. We wish to dedicate this paper to all the scientists who contributed in the field of value-added dairy products.

Contribution of authors

All the authors contributed equally during the preparation, editing, and submission of this manuscript.

Conflict of interest

There was no conflict of interest among the authors.

Financial grant

No financial assistance was received from any organization.

References

1. Pal, M. & Tariku, F. (2024). Physiochemical composition, nutritional value and health benefits of Mithun milk. *International Journal of Food Science and Agriculture*, 8, (2),64-67.
2. Pal, M, (2023). Nutritional profile, uses and health benefits of paneer. *Food Beverage Processing*, 9 (9), 52-53.
3. Haenlein, G.F.W. (2004). Goat milk in human nutrition. *Small Ruminant Research*, 51, 155–163.
4. Park, Y.W. (2017). Goat milk chemistry and nutrition. *Dairy Science and Technology*, 97, 1–15.
5. Park, Y.W., & Haenlein, G.F.W. (2013). Milk and dairy products in human nutrition: Production, composition and health. Wiley-Blackwell.
6. Restani, P., Beretta, B., Fiocchi, A., Ballabia, C., & Galli, C.L. (2002). Cross-reactivity between mammalian proteins. *Annals of Allergy*, *Asthma and Immunology*, 89 (6), 11-15.
7. Pandya, A.J., & Ghodke, K.M. (2007). Goat and sheep milk products other than cheeses and yoghurt. *Small Ruminant Research*, 68, 193-206.
8. Pal, M., Tefera, M., Tasew, A., Jergeta, T., & Derresa, A. (2015). Hygienic and microbiological quality of yoghurt. *Beverage and Food World,* 42, (4),25-28.
9. Ranadheera, C.S., Evans, C.A., Adams, M.C., & Baines, S.K. (2019). Probiotic viability and health benefits of fermented goat milk. *International Journal of Food Microbiology*, 296, 1-8.
10. Serhan, M., Mattar, J., & Debs, L. (2016). Concentrated yogurt (Labneh) made of a mixture of goats' and cows' milk: Physicochemical, microbiological and sensory analysis. *Small Ruminant Research*, 138, 46-52.
11. Yerlikaya, O. (2014). Probiotic potential of goat milk products. *International Journal of Dairy Technology*, 67, 1–10.
12. Salameh, C., & Hosri, C. (2016). Evaluation of the hygienic quality and nutritional value of traditional Lebanese "Kishk", a dried fermented goat milk product. Ben Salem H.(ed.), Boutonnet JP (ed.), López-Francos A.(ed.), Gabiña D.(ed.). Zaragoza: CIHEAM Options Méditerranéennes: Série A. Séminaires Méditerranéens, (115), 169-173.
13. Pal, M., Devrani, M., & Pintoo, S. (2018). Significance of hygienic processing of milk and dairy products. *Madridge Journal of Food Technology*, 3: 133-137.
14. Haenlein, G.F.W. (2017). Goat milk and cheese: Nutrition and processing. *Journal of Dairy Science*, 100, 1-12.
15. Albenzio, M., & Santillo, A. (2024). Ricotta Cheese. In Dairy Foods Processing (pp. 139-150). New York, NY: Springer US.
16. Litopoulou-Tzanetaki, E. (2016). Goat milk cheeses. Handbook of animal-based fermented food and beverage technology, 1, 285.
17. Litopoulou-Tzanetaki, E., & Tzanetakis, N. (1992). Microbiological study of white-brined cheese made from raw goat milk. Food Microbiology, 9(1), 13-19.
18. Deshwal, G. K., Ameta, R., Sharma, H., Singh, A. K., Panjagari, N. R., & Baria, B. (2020). Effect of ultrafiltration and fat content on chemical, functional, textural and sensory characteristics of goat milk-based Halloumi type cheese. LWT, 126, 109341.
19. Prosser, C.G., (2021). Compositional and functional characteristics of goat milk and relevance as a base for infant formula. *Journal of Food Science*, 86(2), 257-265.
20. Reddy, R. S., Ramachandra, C. T., Hiregoudar, S., Nidoni, U., Ram, J., & Kammar, M. (2014). Influence of processing conditions on functional and reconstitution properties of milk powder made from Osmanabadi goat milk by spray drying. *Small Ruminant Research*, 119 (1-3), 130-137.
21. Pal, M., & Devrani, M. (2018). Shrikhand: A delicious fermented dairy product of India. *Beverage and Food World*, 45 (7), 39-40.
22. Bhargava, V. N., Dubey, R. D., & Katara, R. V. (1992). Influence of fat level on production of chhana and rasogolla from goat milk. *Small Ruminant Research*, 8(1-2), 55-65.
23. Mishra, K., Pinto, S., Jambukiya, H., & Prajapati, J. P. (2021). Rheological attributes of goat milk chhana and rasogolla. *Pharma Innovation Journal*, 2727-2735.
24. Vélez-Ruiz, J. F. (2024). Cajeta: A dairy sweet from goat milk. In Sweetened Concentrated Milk Products (pp. 63-78). Woodhead Publishing.
25. Azeem, M., Asim, S., Raza, A., Rasul, H., Ali, M., Khalid, B., & Diantom, A. (2024). Effect of lotus seed powder addition on the physical and organoleptic attributes of chocolate flavour frozen yogurt using goat milk. *Cogent Food and Agriculture*, 10(1), 2396952.
26. Pal, M., Tesfaye, S., & Weldegebril, S. (2012). Hygienic and microbiological aspects of ice cream. *Beverage and Food World*, 39, 42-43.
27. Hayaloglu, A. A., & Karagul-Yuceer, Y. (2011). Utilization and characterization of small ruminants' milk and milk products in Turkey: Current status and new perspectives. *Small Ruminant Research*, 101, 73-83.
28. Ranadheera, C. S., Evans, C. A., Adams, M. C., & Baines, S. K. (2013). Production of probiotic ice cream from goat's milk and effect of packaging materials on product quality. *Small Ruminant Research*, 112 (1-3), 174-180.
29. Gursel, A., Gursoy, A., Anli, E. A. K., Budak, S. O., Aydemir, S., & Durlu-Ozkaya, F. (2016). Role of milk protein–based products in some quality attributes of goat milk yogurt. *Journal of Dairy Science,* 99 (4), 2694-2703.

DOI:10.31579/2637-8914/357