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**Original Article****Marketing and value addition in sheep and goat products**

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**ABSTRACT**

The livestock sector plays a crucial role in developing nations, contributing significantly to agricultural GDP and supporting food security, rural economies, and sustainable agriculture. Goats and sheep, essential for their milk, meat, wool, and hair, offer smallholder farmers a reliable income source due to their adaptability and low maintenance. India is a global leader in goat milk production and ranks highly in meat and wool production (BAHS, 2023). However, the sector faces several challenges, including inadequate infrastructure, an unorganized market, and limited processing and value addition capabilities. Addressing these issues requires modernizing facilities, enhancing cold storage and supply chains, and improving packaging and processing techniques. Value addition through diversified dairy, wool, and meat products can boost profitability and market appeal. Innovations in sheep and goat milk products, wool processing, and pashmina production offer significant opportunities for growth. By tackling existing challenges and embracing value-added approaches, the livestock sector can achieve greater efficiency, quality, and economic benefits.

**Keywords:** Goat, Sheep, Milk, Meat, Wool, Products, Marketing

**INTRODUCTION**

Livestock systems impact the foundation of natural resources, public health, social equity, and economic growth in both positive and negative ways. Livestock is currently one of the agricultural subsectors in developing nations that is growing the fastest. It currently accounts for 33% of the agricultural GDP and is growing rapidly (BAHS, 2023). The fast-rising demand for animal products which is being fuelled by urbanisation, population growth, and rising wages in developing nations is the primary driver of this increase.

Goats and sheep provide nutrient dense milk and meat, as well as wool and hair for textiles, making them essential for food security. Their versatility and affordability in different locations offer smallholder farmers a dependable source of income. They are perfect for small-scale farming due to their durability and low maintenance requirements. From an economic standpoint, their grazing and manure support sustainable agriculture, stimulate market demand, and generate employment opportunities in rural areas.

In dairy, India leads the world in both goat population and milk production, generating 230.58 million tons of milk in 2022-23, which equates to a per capita availability of 459 grams per day, with goat milk making up 3.3% of the total. According to BAHS (2023), India ranks 5<sup>th</sup> globally in meat production with a total output of 9.77 million tons for the 2022-23 period, translating to a per capita availability of 7.10 kg per year. Among this, sheep and goat meat contribute 10.51 and 14.47% respectively, with chevon (goat meat) being the most favoured and widely consumed. Additionally, India holds the 9<sup>th</sup> position globally for wool production, contribution of wool output was 72.17, 13.9 and 13.91% from ewes, rams and lambs, respectively (BAHS, 2023).

### **MARKETING:**

Marketing in meat and milk processing sector in India is unorganized, with several critical issues affecting its efficiency and growth. According to DAHD (2023) the sector's primary challenges include-

**Inadequate Infrastructure:** Meat production is largely neglected, often taking place in open, unhygienic environments prone to contamination. There is a pressing need for modern, scientifically designed abattoirs and processing plants. Currently, only a few state-of-the-art mechanized abattoirs exist, which are eco-friendly and follow international standards. Expanding this infrastructure is crucial to improve hygiene and efficiency.

**Unorganized Sector:** The lack of an organized structure affects farmers' ability to obtain fair prices. The sector's disorganization results in poor quality control and inefficiencies, discouraging farmers from engaging in scientific rearing practices and limiting flock sizes.

**Processing and Value Addition:** There is an urgent need for developing processing facilities and value addition for goat/sheep meat and milk products. Establishing modern meat processing plants with cold storage facilities can help in maintaining the quality and extending the shelf life of meat products. Additionally, innovative processing methods should be introduced to create shelf-stable and value-added products, such as low-cholesterol and nutrient-enriched milk products.

**Cold Storage and Supply Chain:** As meat is perishable, establishing cold storage and maintaining a robust cold chain during transport and storage are critical. Government support is needed to build and support cold storage facilities and ensure the quality of meat products from farm to consumer.

**Consumer-Oriented Programs:** Developing shelf-life enhancing and health-oriented products through novel processing and packaging techniques can improve marketability. Promoting self-help groups, women's and youth entrepreneurship programs can further support sector growth and innovation.

**Contract Farming:** Establishing contractual farming around modern abattoirs can ensure a steady supply of quality, disease-free animals. This model can offer farmers fixed remuneration and support in terms of feed, medicine, and marketing, similar to successful broiler farming practices.

Packing involves wrapping and crating goods for transportation, while packaging places products in smaller units for sale to consumers. Both are essential in marketing agricultural commodities. Packaging offers numerous benefits, including protection against damage, spoilage, and theft, and facilitates easier handling and storage. It also aids in quality identification, branding, and reducing marketing costs, while helping to prevent adulteration and ensure product cleanliness. Additionally, packaging provides crucial information such as storage instructions and expiration dates and extends the product's shelf life. Effective packaging materials must be strong, attractive, convenient, cost-effective, and chemically inert. Despite its added cost, packaging is vital for maintaining the quality and marketability of perishable livestock products.

Zoonotic disease risks are high in traditional wet markets due to unhygienic conditions and the mixing of wild and domestic animals. Effective control requires improvements throughout the entire food supply chain, not just boycotting these markets. Rising consumer awareness and demand for high animal welfare standards are driving changes in meat production, with a focus on sustainability and compliance with Environmental, Social, and Governance (ESG) criteria. To meet these demands, the industry must enhance hygiene, reduce production costs, and adopt eco-friendly technologies for packaging, transport, and storage.

## **VALUE ADDITION OF PRODUCTS**

### ***DAIRY PRODUCTS (SHEEP & GOAT MILK)***

Sheep milk can be processed into various consumable goods such as cheese, yogurt, ice cream, kulfi, and paneer, each offering rich flavours and nutritional benefits. Given its perishable nature, sheep milk should be quickly frozen and stored at temperatures below -20°C to preserve its quality. In cheese-making, sheep milk's natural casein, which binds with calcium, means that no additional CaCl<sub>2</sub> is required. The high protein and fat content of sheep milk also benefit products like ice cream, supporting probiotic survival. As sheep milk is naturally homogenized, no more homogenization is needed in ice-cream preparation from sheep milk. Furthermore, sheep milk contains bioactive peptides with properties such as anti-aging, anti-microbial, antioxidant, and anti-hypertensive effects, appealing to health-conscious consumers. Italy and France are leading exporters of sheep milk cheese, and the milk is increasingly valued in the medical and therapeutic industries for its health benefits. It can also be used to produce non-consumable items like skincare products, including soaps, shampoos, lotions, and lip balms, due to its high fat content and valuable nutrients (Mohapatra, 2021).

Goat milk and its products have significant attention due to their diverse applications and health benefits. Nutritionally, goat milk is utilized in a wide array of products, including dry whole milk, dried granulated milk, condensed milk, fruit yogurt, various cheeses, butter, butter oil, cultured cream butter, ice cream, whey protein concentrate (WPC), evaporated milk, and traditional items like Yayik. These products are valued for their unique nutrient profile and easier digestibility compared to other milk types. Additionally, a notable increase in demand has been observed for

goat milk cheese processed with Feruloyl Esterase (FE) producing strain CRL1446. This processing technique enhances intestinal FE activity and boosts the bioavailability of antioxidant ferulic acid, which may help protect against oxidative stress-related disorders. Beyond nutritional benefits, goat milk is also increasingly featured in cosmetic products such as creams, body lotions, shampoos, after-shave lotions, and hair conditioners, particularly in Western markets. The caproic and caprylic acids in goat milk fat contribute to its effectiveness in enhancing skin permeability, thereby serving as a beneficial vehicle for cosmetic ingredients. This growing interest across both the nutrition and personal care sectors underscores the multifaceted value of goat milk and its derivatives (Singh *et al.*, 2023).

## **WOOL AND FIBER PRODUCTS**

### **Wool processing**

**Mechanical wool processing** begins with shearing to collect raw fleece, which is then dusted and scoured to remove impurities. After carding the cleaned fibres, they are twisted into yarn, which may be dyed and wound onto cones or twisted into hanks. The yarn is then warped, woven into fabric, and subjected to wet processing to achieve the final colour, texture, and quality. (Shanmugam, 2021)

**Chemical processing** improves wool's properties such as shrink resistance and luster. Methods include grafting to enhance hydrophobicity and thermal stability, chlorite treatment to reduce felting, and nano finishes for added functionality like water repellence and fire retardancy (Jose, 2021).

**Bio-Chemical Modification:** Enzyme treatments, such as using protease or laccase, enhance wool's surface properties, including smoothness, dye uptake, and shrink resistance. Biopolymer treatments, like chitosan, improve wool's hydrophilicity and dye absorption while reducing shrinkage (Jose, 2021).

### **Diversified Wool Products**

**Apparel - Fine Wool (20–25 micron):** Suitable for high-quality suits and knitted outerwear, especially when blended with Australian merino wool. **Wool/Polyester Blends:** Ideal for active sportswear due to their durability and moisture management.

**Carpets - Medullated Wool Fibres:** Excellent for carpets due to their durability and appearance retention. Adding 5-10% coarse wool can improve the carpet's look over time.

**Blankets - Fine and Medium Wool:** Used in both non-woven and woven blankets, offering warmth and comfort.

**Upholstery - Fine Wool:** Resists soiling, staining, and burning, making it suitable for high-specification upholstery in vehicles and aircraft.

**Protective Clothing - Flame-Resistant Wool:** Naturally flame-resistant, ideal for safety gear where slow flame spread is crucial.

**Woollen Khadi - Traditional and Modern Use:** Originally made from local Indian wool, now often incorporates Australian Merino wool due to lifestyle changes.

**Quilts** - Wool-filled Quilts: Composed of two fabric layers with wool filling, providing superior warmth and breathability compared to synthetic options. (Shakyawar and Ammayappan, 2021).

### **MEAT PRODUCTS**

Diversified and value-added meat products can be developed through emulsification, restructuring, fortification, enrobing processes.

**Shelf stable products**- Traditional and ready to eat product (Pickles); Ready to eat, convenience product and shelf-stable up to 90 days at room temperature (Cookies)

**Emulsion based products**- Products are made by mincing boneless meat and emulsion is prepared by using salt, polyphosphates, spices, condiments, binders etc. (Nuggets, Patties, Sausages, Kofta)

**Restructured products**- Restructuring is partial or complete disassembling of meat and reforming into the same or different form. (Loaves, Nuggets, Patties)

### **PASHMINA PRODUCTS**

The production of a high-quality pashmina shawl is a meticulous process involving several stages, from the initial collection of fleeces from the Changthangi goat to the final embellishments. It starts with harvesting and sorting the fine pashmina fibres, followed by dehairing, scouring, and carding to prepare the fibres. The cleaned fibres are then spun into yarn, which is dyed if needed and prepared for weaving or knitting. After the fabric is created, it undergoes finishing processes, including dyeing and setting, before being enhanced with intricate embroidery or fringes. Each step is labour-intensive and requires skill, contributing to the shawl's luxurious quality and value. (Ammayappan *et al.*, 2011)

Addressing the challenges in the pashmina industry involves several strategic steps. Blending pashmina with other materials can help lower costs and expand its appeal. Embracing advanced technologies, such as water-resistant treatments and fragrance infusions, can add value and enhance the product. Implementing clear labelling and regulations is crucial for distinguishing authentic pashmina from counterfeit items. Developing efficient testing methods will tackle mislabelling issues. Finally, adopting modern technologies in spinning and weaving processes can increase efficiency and reduce production costs. These measures can significantly enhance the value and market presence of pashmina products. (Ammayappan *et al.*, 2011)

### **ADVANTAGES OF VALUE ADDITION**

- Creates newer diversified and healthier products
- Increases profit
- Enhanced shelf life of the product
- Convenience to the consumer
- Effective utilization
- Improves quality & provide safe food
- Generates employment

## CONCLUSION

The livestock sector is crucial for the economies of developing countries like India, playing a key role in food security, income generation, and rural employment. However, it faces significant challenges, including poor infrastructure, lack of organization, and limited processing capabilities, which impede its potential. To fully realize its benefits, it is essential to address these issues by investing in modern facilities, establishing effective cold chain logistics, and developing consumer-focused programs. Value addition in dairy, meat, wool, and pashmina products offers opportunities to improve quality, prolong shelf life, and increase profitability. By adopting innovative practices and enhancing marketing strategies, the livestock industry can satisfy growing consumer demands while fostering sustainability and resilience, thereby contributing to economic growth and social equity.

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