

Breeding Strategies to Improve Goat Meat & Milk Production in India: An Overview

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Abstract

Goats are a vital source of livelihood for small farmers and landless laborers, particularly empowering women in regions like Bihar, Jharkhand, West Bengal, Rajasthan, and tribal areas. Goat farming is a crucial source of income for rural and urban communities, particularly in areas with extensive sheep and goat management systems, with the potential to uplift economically backward families. This review article offers a comprehensive exploration of breeding strategies aimed at improving goat meat & milk production in India. We will focus into the advantages of selective pure breeding and crossbreeding, emphasizing the significance of factors such as breed selection, performance monitoring, and artificial insemination. Additionally, we will highlight successful instances of breeding programs implemented in India and outline vital considerations for ensuring the sustainability of such initiatives.

Keywords: Goats, Breeding, Milk, Meat, Production

Introduction

Goats have played pivotal roles for over 9,000 years in providing milk, meat, cashmere, and mohair. Goats are also helpful in poverty reduction, food security, job creation, and rural income. Goats emerge as a promising 'Future Animal' for enhancing well-being in both rural and urban areas. Goat farming is a crucial source of livelihood for small farmers and landless labourers, particularly empowering women in regions like Bihar, Jharkhand, West Bengal, Rajasthan, the NEH region, and tribal areas (Project report on goat farming). Goats are integral, constituting over 52% of a household's income for enhanced food and nutritional security (Kumar *et al.*, 2003). The adaptability of goats to various agro-climatic conditions allows for sustainable practices on limited land with diverse vegetation (Kochewad *et al.*, 2023).

Goats hold cultural importance for home slaughter during festival like Eid and offerings to Goddess Kali for Rituals. Goats are easily managed due to their small size with minimal maintenance costs. With high reproductive rates, and societal

acceptance, goat farming is an ideal and cost-effective choice for livelihoods in disadvantaged rural households (Kumar *et al.*, 2010). Despite India's dominant position in the global goat industry, contributing over 33% of the world's goat milk and ranking second in goat meat production, lower productivity persists. Challenges such as suboptimal nutrition, inadequate management, and limited access to quality genetics hinder productivity. Addressing this, strategic breeding can play a vital role in enhancing productivity (Vahoniya *et al.*, 2022). By selecting and pairing goats with desirable traits, breeders can enhance genetic potential, leading to improved growth rates, milk production, carcass quality, and overall profitability in goat farming (Tyasi *et al.*, 2022).

This article provides a thorough analysis of breeding techniques used to increase the production of goat and chevon milk in India. We will examine the benefits of both selected pure breeding and crossbreeding, stressing the importance of elements like artificial insemination, breed selection, and performance monitoring. We will also provide successful examples of breeding

programmes that have been put into place in India and discuss important factors that need to be considered to make sure these programmes remain sustainable.

Goat Population in India

India, the global leader in goat population with 148.88 million according to the 20th Livestock Census, contributes 27.74% to the overall domestic animal count (DAHD, 2023). With a 10.14% increase in population since 2012, the country hosts 28 registered goat breeds, excelling in meat, milk, and fibre production, as reported by NBAGR in 2017. According to ICAR-NBAGR amongst all breed Black Bengal and Osmanabadi are known for their chevon quality, Jamunapari and Beetal for more milk, and Changthangi for prized pashmina. In terms of regional distribution, Rajasthan leads the way with the highest goat population, constituting 20.8% of the total, followed by West Bengal at 16.3%, and Uttar Pradesh ranking third with 14.5%. Notably, the rural goat population surged by 10.35%, while urban areas saw a 5.78% increase between 2012 and 2019. (DAHD, 2023).

Goat Production

Goat plays a vital role in meat, milk, and fiber production, including Coarse Hair, Pashmina, and Cashmere. This article focuses on meat and milk due to their greater economic impact, with particular emphasis on Cashmere. The production of Cashmere involves a breeding process, crossing goats with lower Pashmina production capabilities with Angora (a goat breed recognized for its Mohair fiber) (Saleh *et al.*, 2023).

Milk

Goat milk is known for its therapeutic qualities due to varied grazing, is now recognized for its positive impact on human health. With similarities to human milk and ease of digestion, attributed to smaller fat globules, goat milk's health-promoting attributes are noteworthy (Alkaisy *et al.*, 2023). Notably, the production of goat milk has seen a substantial increase, growing from 5.8 million tons in 2019-20 to 7.6 million tons in 2022-23, marking a 1.3-fold increase with annual growth rate of 3.84%. India has now ascended to the top position globally in goat milk production. (DAHD, 2023).

Meat (Chevon)

Goats in India are key contributors for meat production, with Chevon (goat meat) favored for its low-fat content and absence of religious restrictions. Chevon production in India significantly increased from 1.2 million tons in 2021-22 to 1.4 million tons in 2022-23, a

remarkable 5.13 % annual growth in meat production (DAHD, 2023).

Contribution To National Economy

Goats significantly contribute to rural well-being and economic stability, providing supplementary income to around 70 million farmers in 500,000 remote villages. The goat sector contributes 8.4 % to India's livestock GDP i.e. 38,590 crores through meat (Rs. 22,625 crores), milk (Rs. 9,564 crores), skin (Rs. 1491 crores), manure (Rs. 1,535 crores) and others Rs 3,360 crores (Suresh, 2013). The goats and its products contribute ₹ 22,138.4 crore annually to the national economy. Goat husbandry also generates about 4.2% of rural employment to the small, marginal farmers and landless laborers. More than 20 million smallholder families are engaged in goat keeping. Goat husbandry generates employment to more than 4 million people, mostly (95 %) of them are small and marginal farmers and landless labourers (Khadda *et al.*, 2018). Women are also benefited by goat rearing being the main custodian in rural areas, especially in Bihar, Jharkhand, West Bengal, Rajasthan, NEH and many tribal regions of the country.

Goats Contribution to Livelihood Assets

Goats play a unique role in supporting India's impoverished communities, with extensive sheep and goat management systems, with the potential to uplift people from poverty. In evolving agro-climatic conditions, Goat production, starting from small flocks, is evolving into a booming 'livestock industry,' emphasizing meat and skin production. 'Goat meat' is in high demand, commanding a premium price, and goat milk is believed to have medicinal and health-enhancing properties. Goats, cost-effective when grazing naturally, offer a higher economic return, crucial for ensuring family financial stability. In times of hardship, such as crop failures or illnesses, selling goats provides resources for essential needs like food and medicines (Kumar *et al.*, 2010).

Goats Contribution to Human Capital

Goats contribute essential nutrition through milk and meat, particularly valuable for children, malnourished individuals, pregnant/lactating mothers, and the elderly, especially in areas without easy access to cow or buffalo milk (Pellerin, 2001). Notably, there are no religious prohibitions against goat meat or milk consumption. Goat meat is rich in protein with lower fat compared to beef and pork, is globally recognized as a significant source of sustenance. It becomes a crucial dietary option for those avoiding certain meats due to religious or personal reasons.

Development of Breeding Tactics to Enhance Goat Quality

An efficient and actionable breeding approach is a crucial component of the broader effort to enhance goat population for meat, fiber, or milk production. When crafting a breeding strategy for goat improvement, those responsible should consider the following factors:

1. Suitability of a breed for the local agro-climatic conditions.
2. The socio-economic status of farmers interested in goat farming.
3. The demand for live animals or milk in a specific region.
4. The availability of young bucks with superior genetics and reproductive capabilities.
5. The conservation and improvement of native (non-descript) breeds, protecting them from unchecked genetic decline by avoiding the use of genetically inferior or other breed males.

Breed Selection

Selecting breeds for a breeding program requires considering production objectives, environmental conditions, breeding stock availability, and market demand for chevon and goat milk. For high milk production, breeds like Beetal, Jamunapari, or Surti are suitable, while those focusing on meat should choose rapid-growing breeds like Black Bengal, Osmanabadi, or Boer' (Vikaspedia, 2020).

Performance Recording

Performance recording involves systematically collecting data on individual goat performance, aiding in breeding selection, program evaluation, and informed management decisions. Key traits include growth rate, milk yield, carcass quality, reproductive performance, and disease resistance. Despite being demanding, the benefits of informed decision-making outweigh the associated costs, leading to significant enhancements in goat production (Nguyen *et al.*, 2023).

Breeding Approaches for Genetic Improvement

Despite the substantial increase in global goat populations, few well-structured selection programs are implemented in developing countries like India neglecting the social and economic significance of goats. While misconceptions about goats' role in desertification have been dispelled, there is a limited prioritization of goat production compared to sheep. Precise identification of breeding objectives is crucial in any program, especially for bucks, to advance genetic quality. The breeding program should remain adaptable,

allowing the integration of new selection criteria and objectives.

Selective Pure Breeding

Selective pure breeding pairs goats of the same breed to enhance genetic uniformity and stabilize desirable traits. For example, breeders seeking higher milk production in Beetal goats carefully mate high-yielding does with bucks known for excellent milk-producing traits. This approach provides control over the herd's genetic composition, vital for preserving breed qualities. However, caution is necessary to prevent inbreeding depression, managed by maintaining a diverse breeding population (Nimbkar & Ghalsasi, 2012).

Crossbreeding

Crossbreeding involves mating goats from different breeds to introduce new genes and enhance specific traits. For example, to improve growth in Black Bengal goats, crossing them with Boer goats known for rapid growth is an option. The primary advantage is heterosis, leading to superior performance in crossbred offspring. However, careful breed selection is crucial, as not all crosses yield favorable results. Thorough research and expert consultation are essential before starting a crossbreeding program (Gangwar *et al.*, 2019).

Strategies For Enhancing the Production of Goat Meat Through Selective Breeding Methods

Selecting the goat breeds in herds aims for Chevon (goat meat). Critical factors for meat production include reproductive rate, kid survival, feed efficiency, slaughter weight, and dressing percentage. Breeding strategies focus on enhancing growth, body weight, reproductive efficiency, and minimizing mortality. Identifying optimal slaughter weight is crucial for improving meat production (FAO).

To boost growth rate and Chevon production, regions with abundant high-quality feed can consider crossbreeding indigenous breeds with Boer or Anglo-Nubian. The choice between intra-population breeding and crossbreeding depends on locality needs, market demand, and emphasized traits.

Strategies For Enhancing Milk Production Through Breeding

Exotic breeds such as Alpine and Sannen have been employed in conjunction with indigenous breeds to enhance their milk production capabilities. Within the category of indigenous breeds, prominent dairy breeds include Jamunapari, Beetal, Barbari, Jakhrana, Sirohi, and

Surti, although their milk production levels do not match those of the superior exotic dairy breeds. The choice between selective breeding and crossbreeding depends on factors such as local requirements, market demand, survivability in area, and the specific traits in consideration.

Given that milk yield traits exhibit a medium to high heritability, opting for selective breeding is likely to yield more favorable results. It is advisable to promote performance recording and progeny testing programs to identify and propagate elite bucks. Establishing nucleus flocks/herds composed of high-performing females and their male progenies, linked with farmers' flocks, can contribute to genetic improvement. The adoption of artificial insemination, preferably with frozen semen, can enhance the effectiveness of progeny testing programs.

Furthermore, breeds like Jamunapari, Beetal, Jakhrana, and Surti can be introduced in other regions to enhance both milk and meat production. Crossbreeding with Sannen goat breeds, particularly in areas with abundant feed resources and the potential for cultivated fodder/concentrate availability, is recommended. The crosses involving Sannen breeds have demonstrated optimal performance in terms of milk production, survivability, and reproduction, making them a viable option for improving overall productivity (Mandal, 2014).

Artificial Insemination

Artificial insemination (AI) is a sophisticated breeding technique involving precise deposition of buck semen into a doe's reproductive tract. Advantages include increased semen utilization, reduced disease transmission risk, enhanced genetic control, and improved access to high-quality genetic resources. AI is valuable for breeders aiming to harness the genetic potential of superior bucks.

Conclusion

Goat farming plays a crucial role in improving rural livelihoods and food security in India, making a significant contribution to the national economy. Using selective breeding and crossbreeding techniques strategically can boost goat productivity in both meat and milk production. Techniques like artificial insemination and performance recording are essential for promoting superior genetic traits, resulting in better growth and yields. A balanced approach that includes preserving indigenous breeds and integrating superior exotic breeds is key to genetic enhancement. Overcoming challenges like poor nutrition and inadequate management with these

methods can enhance productivity and profitability. Sustainable breeding programs are essential for the ongoing development of India's goat farming industry.

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