



A REVIEW ON SHEEP FARMING PRACTICES IN ARID AND SEMI-ARID REGIONS: ECONOMIC VIABILITY AND WOOL PRODUCTION TRENDS

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ABSTRACT

Sheep breeding is an important activity in augmenting rural living in the semi-arid and arid regions of India, whose agricultural performance is prone to be resisted by environmental constraints. This review assesses the multi-faceted significance of sheep rearing, highlighting its viability, adaptability, and potential in augmenting rural economies. The paper discusses wool production trends, traditional and improved breeds of sheep, and market forces influencing the industry. Despite having one of the world's biggest flocks of sheep, India's output of wool is low due to genetic limitations and inadequate breed management. The sector is faced with several issues, including shortages of feed and fodder, availability of water, diseases, and poor access to veterinary services and markets. Sheep rearing, though confronted by such difficulties, has diversified income sources of meat, milk, manure, and wool and thus qualifies as a sustainable livelihood option in resource-poor settings. The review stresses the need for participatory breeding schemes, stronger policy implementation, increased market connections, and veterinary services access to improve productivity and earnings. Improvement of the sheep farming system can contribute significantly to food security, livelihood, and rural resilience in India's dryland regions.

Keywords: - *Sheep farming, Economy, Wool production, Rural living etc.*

INTRODUCTION

Sheep farming is essential for sustainable livelihood opportunities in India, especially in regions with elevated crop failure rates. The sheep population has risen in Telangana, Andhra Pradesh, and Karnataka, regions with a higher incidence of farmer suicides. Large ruminants are cultivated for milk production, while sheep provide a safeguard and can serve as a means of livelihood security in dry and semi-arid areas. Small ruminants, including



sheep and goats, are integral to the socio-economic and cultural sustenance of rural communities, supporting the livelihoods of two-thirds of the rural populace. They are well adapted to extreme temperatures, capable of extensive movement, resilient to tropical ailments, and able to withstand an inadequate diet and water scarcity. Sheep farming serves as a crucial source of livelihood in impoverished or emerging regions such as the steppe, Chiapas in Mexico, the North Caucasus, and Algeria. India has the second -place sheep population, with around 4.03% of the global total. Sheep have evolved via domestication and both natural and human selection over the past 12,000 years, serving as a reliable source of revenue for livestock owners. Genetic variety is crucial for addressing the current and future demands of sheep production and human requirements [1].

In India, sheep husbandry is an essential component of the livestock sector, contributing 4.9% to the national gross value added product and accounting for 28.4% of the agricultural GDP in 2017-18. In India, the sheep population is 74.26 million, which accounts for nearly 13.86% of the total livestock population. Sheep meat has the potential to address this deficit through strategic planning, as meat consumption in India is increasing at a rapid pace. Sheep husbandry renders a substantial contribution to the economic sustenance and subsistence of rural farmers, particularly in arid and semi-arid regions [2].

In these regions, there are 14 distinct sheep breeds/strains, and the primary source of income for producers is sheep husbandry. The state government has established and implemented policies for breed enhancement, but their effectiveness remains restricted. Breed development policies should be perceived as a bottom-up approach, rather than a conventional top-down approach. The ICAR-Central Sheep and Wool Research Institute (CSWRI) has improved local sheep breeds, such as Malpura, Magra, Marwari, Chokla, Patanwadi, Sonadi, Muzaffarnagari, Avikalin, prolific Avishaan, Dumba, and breeds that can survive in dry areas. Additionally, the institute has developed novel strains. For increased profitability, the Avishaan, *Haemonchus contortus*-prolific sheep generate an increased number of offspring per ewe. The potential for selective breeding in Patanwadi sheep for milk is significant, and the crossbreeding of Australian robust wool Merino sheep with wool sheep from western Rajasthan could prove to be a promising solution. The implementation



of breeding programs is typically challenging and necessitates the involvement of pastoral communities [3].

Grazing lands or uncultivated desolate lands are more abundant in the western region of the north-western arid and semi-arid regions of India, which are particularly conducive to sheep cultivation. Through the sale of animals (3.26%), milk (8.65%), fleece (6.72%), and manure (6.72%), sheep husbandry generates a total income of 81.36%. To enhance sustainability and profitability, it is imperative to enhance market accessibility, establish cooperative societies, provide microcredit, and leverage information technology [4].

SHEEP HUSBANDRY: WOOL PRODUCTION TRENDS

In every Indian state, raising sheep is one of the most well-known and profitable enterprises. There, the investment generates four sources of income: manure, milk, meat, and fiber. Sheep ranching plays a significant role in the rural economy, especially in the country's hilly areas. Sheep may breed in small groups, although the practice is not advised. Cattle require far less comfort and luxury than other animals, even if humans must care for them for a little longer than most others. All the animals need is somewhere to stay. India has many sheep, and both the sheep and their bad shepherds will profit in the future. With over 48 million cows, India is the sixth-largest cow producer worldwide. Cattle provide around 45,000 crore rupees, or 10% of the NGP, to the national economy each year. Sheep are a vital component of the agricultural economy since they generate wool, meat, skins, and dung, especially in the country's semiarid and arid regions. Shepherds make a steady living from the sale of livestock and wool. India has significantly increased the number of cattle worldwide. In the rural sector, livestock are significant sources of employment and revenue [4].

Wool Production: Sheep contribute 40.42 million kg of wool, a figure that has been steadily decreasing since 2013-14 (47.91 million kg). In comparison to the global average of 2.4 kg, the average annual yield per sheep in India is 0.9 kg. The country's export earnings from woolen products (carpet, knitwear, etc.) are substantial, amounting to Rs. 13184.36 crore in 2018-19. These earnings are evenly distributed among organized and decentralized sectors.



The woolen industry employs nearly 3.52 million individuals in the organized wool sector, livestock husbandry, and weaving sector. Out of the entire production of unprocessed wool, 5% is classified as apparel grade, 85% as carpet grade, and 10% as coarse grade. Rajasthan is the leading producer of wool, with a production of 14.52 million kg. Gujarat produces 2.27 million kg of wool, while Uttar Pradesh produces 1.32 million kg. The majority of sheep strains in Rajasthan are of the wool type, which is suitable for a variety of applications, including carpets, felt, and handicrafts. In recent years, the value of wool as a commodity has decreased as a result of the widespread availability of inexpensive synthetic fibers and the significantly lower returns from wool in comparison to mutton. The price of wool in the north-western region varies between Rs. 40/kg for coarse wool and Rs. 350/kg for carpet wool. It has been reported that the income from wool is approximately 11.00% for small farmers, 8.10% for medium farmers, and 8.46% for large farmers [5].

The price of wool demonstrated a consistent decline in comparison to that of milk and mutton. Punjab is the primary concentration of woolen facilities in India, with Haryana and Rajasthan following in that order. The fleece yield of sheep is higher in arid and semi-arid regions than in other regions. In western Rajasthan, the price of lustrous wool from Magra sheep is elevated as a result of the high demand in the carpet industry. The wool production in India is insufficient to satisfy the entire demand for unprocessed wool in the woolen industry. Consequently, it is substantially dependent on the importation of wool from foreign nations. This has a detrimental effect on the international market price of wool products and the Indian economy. Wool is primarily imported from Australia, China, and New Zealand. In 2013-14, 89.59 million kg of unprocessed wool was imported, and in 2017-18, 79.95 million kg, totaling INR 1884.59 crore [6].

The improvement of Indian carpet wool production of sheep strains through genetic selection alone is insufficient to address the disparity between demand and supply of wool. Our previous experience with the importation of fine fleece exotic sheep breeds was disheartening, primarily due to the poor adaptability of exotic germplasm. The majority of the exotic varieties were imported in the 1960s, including the Rambouillet sheep from Texas, USA, and the Soviet Merino from Stavropol, former USSR. There has been no attempt to improve the production of carpet fiber. The current state of Indian sheep husbandry has



undergone a significant transformation. The strong wool Australian Merino sheep' that Australia has developed are well-suited to the scorching and arid regions of the country, which are quite comparable to the arid and semi-arid climate of India. The strongest-wool Merinos are found in western New South Wales, South Australia, and Western Australia. They generate approximately 7 to 8 kg of wool, with a fiber diameter of 23–25 μ and a staple length of 10 cm [7].

The government possesses the authority to approve the importation of Merino livestock, which is highly productive in Australia. The interaction between genotype and environment should be investigated by rearing these exotic breeds in arid and semi-arid regions of the country. After adaptation, exotic breeds may be employed in the cross-breeding of Indian carpet sheep [8]. To enhance the production of carpet wool in native sheep from arid and semi-arid regions, this initiative must be conducted with a single breeding objective.

ECONOMIC CONTRIBUTION IN SHEEP FARMING

Sheep hold a significant position in the agricultural economy of several nations. China, Australia, India, and Iran possess the highest contemporary sheep populations. They cater to both domestic and export demands for wool and mutton. Countries like New Zealand possess lesser sheep populations yet maintain a significant worldwide economic influence through the sale of ovine products. They significantly contribute to several local economies, often within specialized markets centered on organic or sustainable agriculture and local food consumers. In poorer nations, sheep herds are a component of subsistence agriculture rather than a commercial enterprise [9].

Sheep yield a diverse range of basic resources. Wool was among the initial basic materials utilized in textiles. In the late 20th century, wool prices saw a significant decline due to the rising popularity and affordability of synthetic fibers. Fleeces serve as a material for the production of alternative products, including wool insulation. The sheep business is the most lucrative enterprise concerning meat sales. People use sheepskin to produce footwear, apparel, carpets, and several other items. By-products from sheep slaughter are valuable; sheep tallow may be utilized in candle and soap production. Sheep bone and cartilage have been utilized to produce carved objects like dice and buttons, in addition to rendering glue



and gelatin. Sheep intestines are utilized to create sausage casings. Sheep feces, rich in cellulose, have been sterilized and combined with conventional pulp ingredients to produce paper [10]. Among the by-products of sheep, lanolin is the most important; it is a waterproof fatty substance naturally occurring in sheep's wool and utilized as a foundation for several cosmetics and other items. Sheep producers get revenue from live sheep by supplying lambs for youth programs and competitions at agricultural exhibitions. This process is frequently a reliable channel for the selling of sheep. Farmers opt to specialize in a specific breed of sheep to sell certified purebred animals and offer ram leasing services for breeding purposes. An alternative method for generating profit from live sheep is the leasing of flocks for grazing purposes. Public areas employ these services to control undesirable vegetation and mitigate fire hazards [11].

Sheep possess unique economic benefits relative to other animals. Sheep do not require costly housing, unlike hens or pigs. Sheep ingest flora, including deleterious weeds that are often avoided by most other animals. Sheep reproduce at an accelerated rate, yielding a higher number of offspring. In contrast to the majority of livestock species, the expense of rearing sheep is not inherently linked to the prices of feed crops like grains, soybeans, and maize. A small farmer can achieve more profitability due to these variables and reduced costs associated with excellent sheep, along with decreased overhead for sheep producers. Sheep rising is particularly advantageous for independent producers, including family farms with constrained resources, as the sheep industry remains one of the few sectors of animal agriculture that has not undergone vertical integration by agribusiness [12].

CHALLENGES IN SHEEP FARMING

Sheep farming in arid and semi-arid areas has many difficulties that compromise its viability, sustainability, and output. Low rainfall, poor soil fertility, and little vegetation define these areas and directly affect sheep health, reproduction, and wool quality.

Feed and Fodder Shortages

Among the most important issues are inadequate supply of year-round quality feed and fodder. Overgrazing and seasonality provide irregular pasture access that reduces nutrient intake for sheep, therefore affecting growth rates, fertility, and wool output. Shortages in



green feed during dry spells drive farmers into low-nutritive crop residue use, therefore reducing animal output even more [13].

Scarcity of Water

Another basic concern is access to water, especially in dry areas experiencing drought. Lack of water not only affects animal drinking but also pastures replenishment, therefore aggravating shortages of feed [14]. This influences animal welfare as well as wool output, thereby causing financial losses.

Illnesses and inadequate veterinary care

Because of poor cleanliness, insufficient preventative care, and restricted access to veterinary treatment, these areas' sheep are quite vulnerable to parasitic and infectious illnesses. Common infections such enterotoxaemia, foot rot, and ectoparasitic infestations cause great morbidity and death rates [15].

Low Genetic Potential and Problems in Breeding

Generally speaking, locally adapted indigenous sheep breeds found in these nations have little genetic ability for meat and wool production. Furthermore limiting genetic growth include ineffective access to genetically better rams and lack of well-designed breeding programs [16]. Moreover, many times farmers lack understanding of scientific breeding techniques and use locally used, less successful techniques instead.

Price changes and market access

Profitability is much threatened by limited market access and changing wool and meat prices. Smallholder farmers typically rely on middlemen and are prone to negotiating drawbacks; so, their part of the market price at consumption is diluted. Furthermore decreasing the price of wool and beef are faulty handling, transportation, and processing infrastructure effects [17].

Degradation of Environment and Climate Change

Variation in the climate has made sheep husbandry increasingly unpredictable. Pastures' quality and availability have suffered from climatic change, increasing temperatures, protracted droughts, and soil degradation. The changes in the climate sweep throughout the whole agricultural system, increasing production expenses and lowering returns.

Deficit in institutional support and extension services



Usually, government extension services in such places have somewhat limited reach. As a result, most farmers remain uninformed about optimal practices, subsidies, or programs meant to increase livestock growth. Inadequate institutional support reduces the acceptance of improved technology and techniques, hence preserving poor productivity [19].

CONCLUSION

Sheep rearing in India's semi-dry and arid tracts is not merely an agricultural enterprise — it is a mode of life, particularly for small and marginalised farmers. In spite of encountering various problems like feed scarcity, drought, problems of disease control, and inadequacy of infrastructures, the industry is still robust and dynamic. The resilience of native sheep breeds, combined with their capacity for survival under adverse environmental conditions, renders them a vital component of sustainable rural livelihoods. The financial input from sheep rearing is not merely in wool output but also in meat, dung, and even milk in certain cases. Yet the per-animal wool output from India remains comparably low on a global level. This decrease owes largely to low breed quality, lack of scientific breeding programmes, and limited availability of information or exposure to advanced farming techniques amongst rural shepherds. Moreover, the lack of a well-established marketing chain generally discourages farmers from getting good prices for their crops. To realise the true potential of sheep farming, a more inclusive and integrated strategy needs to be initiated. This would involve enhancing the genetic quality of breeds by implementing selective crossbreeding programmes, ensuring routine veterinary services on time, increasing fodder availability, and educating farmers in improved management techniques. Policy interventions need to be on the basis of long-term sustainability, equal support systems, and attaining market access in order to increase rural incomes. Finally, sheep farming can be an instrument for combating rural poverty, improving livelihood security, and enabling the higher ends of food security and economic growth of the drylands. With the right inducement of policy, infrastructure investment, and knowledge transfer, this ancient livelihood can turn out to be a high-tech and profitable business venture for India's arid-semi-arid hinterland tracts.



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