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Sheep Genetic Resources of India

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Abstract

India possesses a rich and diverse repository of sheep genetic resources, reflecting its varied agro-climatic conditions and traditional livestock rearing systems. Indigenous sheep breeds have evolved over centuries under natural and farmer-led selection, resulting in unique adaptations to harsh environments, disease challenges, and low-input management systems. The present article compiles and discusses Indian sheep breeds based on their geographical distribution, production characteristics, and genetic importance. A total of 47 breeds representing different regions of the country highlight the immense biodiversity within the species. These genetic resources play a crucial role in sustaining rural livelihoods, ensuring food security, and supporting climate-resilient livestock production systems. Conservation and scientific utilization of these breeds are essential for future genetic improvement and sustainable development.

Introduction

Sheep genetic resources constitute an important component of India's livestock biodiversity. The country is home to a large number of indigenous sheep breeds, each uniquely adapted to specific ecological niches ranging from the arid deserts of Rajasthan to the high-altitude Himalayan regions and humid coastal belts. These breeds are primarily reared under extensive and semi-intensive systems, where natural selection plays a significant role in shaping their genetic architecture.

The importance of sheep in India extends beyond meat and wool production. They contribute to rural employment, income generation, and risk mitigation for smallholder farmers. Indigenous breeds, in particular, are characterized by their resilience, disease resistance, and ability to thrive under minimal management, making them valuable genetic assets in the context of climate change and resource scarcity.

Classification of Indian Sheep Breeds Based on Geographical Distribution

The diversity of sheep breeds in India can be effectively understood through their regional distribution, which reflects adaptation to local environmental conditions.

1. Northern and Himalayan Region

This region includes breeds adapted to cold climates, high altitudes, and migratory pastoral systems. These sheep are generally hardy and capable of surviving under extreme climatic conditions.

- Bhakarwal (Jammu and Kashmir)
- Changthangi (Jammu and Kashmir)
- Gaddi (Himachal Pradesh)
- Gurez (Jammu and Kashmir)
- Karnah (Jammu and Kashmir)
- Poonchi (Jammu and Kashmir)
- Rampur Bushair (Himachal Pradesh)
- Tibetan (Arunachal Pradesh)

These breeds are often associated with migratory communities and are valued for wool production and adaptability.

2. North-Western Arid and Semi-Arid Region

This region represents one of the most important sheep-rearing zones in India, characterized by extreme temperatures, low rainfall, and sparse vegetation.

- Chokla (Rajasthan)
- Jaisalmeri (Rajasthan)
- Magra (Rajasthan)
- Malpura (Rajasthan)
- Marwari (Rajasthan and Gujarat)
- Nali (Rajasthan)
- Pugal (Rajasthan)
- Sonadi (Rajasthan)
- Kheri (Rajasthan)
- Avishaan (Rajasthan)

These breeds are primarily known for carpet wool and mutton production and exhibit strong adaptation to drought conditions.

3. Southern Peninsular Region

Sheep in this region are mainly reared for meat production under semi-arid and tropical climates.

- Bellary (Karnataka)
- Hassan (Karnataka)
- Kenguri (Karnataka)
- Mandya (Karnataka)
- Deccani (Andhra Pradesh and Maharashtra)
- Nellore (Andhra Pradesh)

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- Kenguri (Karnataka)
- Mandya (Karnataka)
- Deccani (Andhra Pradesh and Maharashtra)
- Nellore (Andhra Pradesh)
- Macherla (Andhra Pradesh)
- Chevaadu (Tamil Nadu)
- Coimbatore (Tamil Nadu)
- Kilakarsal (Tamil Nadu)
- Madras Red (Tamil Nadu)
- Mecheri (Tamil Nadu)
- Ramnad White (Tamil Nadu)
- Tiruchi Black (Tamil Nadu)
- Vembur (Tamil Nadu)
- Katchaikatty Black (Tamil Nadu)

These breeds are characterized by faster growth rates, better carcass traits, and adaptability to heat stress.

4. Eastern and Central Region

This region includes breeds adapted to humid and sub-humid climates, often reared under low-input systems.

- Balangir (Orissa)
- Ganjam (Orissa)
- Kendrapada (Odisha)
- Chottnagpuri (Jharkhand)

- Shahbadi (Bihar)
- Jalauni (Uttar Pradesh and Madhya Pradesh)
- Muzzafarnagri (Uttar Pradesh and Uttarakhand)

These breeds are mainly utilized for meat production and are important for local consumption.

5. Western Region (Gujarat)

- Panchali (Gujarat)
- Patanwadi (Gujarat)

These breeds are adapted to semi-arid conditions and contribute to both meat and wool production.

6. North-Eastern and Special Adaptive Breeds

- Bonpala (Sikkim)
- Garole (West Bengal)

Garole sheep are particularly important due to their prolificacy and genetic contribution to fecundity traits.

Functional Classification of Indian Sheep Breeds

Based on utility, Indian sheep breeds can be broadly classified into:

Meat-Type Breeds: These breeds are primarily raised for mutton production and dominate southern and central India.

- Deccani
- Nellore
- Mandya
- Mecheri
- Madras Red

Wool-Type Breeds: These are mainly found in northern and north-western regions.

- Chokla
- Magra
- Marwari
- Nali

Dual-Purpose Breeds: These breeds provide both meat and wool.

- Malpura
- Sonadi
- Jaisalmeri

Synthetic and Improved Sheep Breeds in India

Recent advances in genetic improvement have led to the development of synthetic breeds such as Avishaan, designed to enhance mutton productivity under Indian production systems.

The Avishaan sheep is a synthetic prolific mutton strain developed by the ICAR-Central Sheep and Wool Research Institute, Avikanagar, Rajasthan, through the stabilization of a

composite cross involving Garole sheep (12.5%), Malpura sheep (37.5%), and Patanwadi sheep (50%). The breeding objective was to integrate the high prolificacy traits of
Garole with the adaptability of Malpura and the superior growth and body conformation of Patanwadi under semi-arid production systems. Avishaan sheep exhibit enhanced reproductive efficiency, particularly higher twinning rates, along with satisfactory growth performance and survivability under field conditions

Genetic Importance of Indigenous Sheep Breeds

Indian sheep breeds represent a valuable pool of genetic diversity, which is crucial for future breeding and conservation programs.

Key genetic attributes include:

- Adaptation to extreme climatic conditions
- Resistance to endemic diseases and parasites
- Ability to utilize low-quality feed resources
- Reproductive efficiency under extensive systems

Certain breeds, such as Garole, have been extensively studied for their high prolificacy and have contributed to genetic improvement programs globally.

Role in Rural Livelihoods

Sheep farming plays a significant role in supporting rural economies, particularly among smallholder and pastoral communities. Indigenous breeds require minimal inputs and provide regular income through the sale of animals, wool, and manure. Their adaptability reduces production risks, making them a reliable source of livelihood in marginal environments.

Challenges in Conservation and Utilization

Despite their importance, Indian sheep genetic resources face several challenges:

- Genetic dilution due to indiscriminate crossbreeding
- Decline in grazing lands
- Lack of organized breeding programs
- Inadequate performance recording systems
- Limited awareness about conservation

Strategies for Conservation and Genetic Improvement

To ensure sustainable utilization of sheep genetic resources, the following measures are essential:

- Implementation of breed-specific conservation programs
- Strengthening of field performance recording systems

- Promotion of community-based breeding programs
- Use of molecular tools for genetic characterization
- Development of region-specific breeding policies

Conclusion

India's sheep genetic resources represent a rich and diverse heritage with significant economic, ecological, and genetic value. The wide range of breeds adapted to different agro-climatic conditions highlights the importance of indigenous livestock in sustainable agriculture. Effective conservation and scientific utilization of these resources are critical for enhancing productivity, ensuring climate resilience, and supporting rural livelihoods. A balanced approach integrating traditional knowledge with modern genetic tools will be key to unlocking the full potential of India's sheep biodiversity.