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Conservation Status and Characteristics of Gurez Sheep of Jammu and Kashmir: An Overview

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ABSTRACT

The Gurez sheep breed, indigenous to the Gurez Valley of Bandipore district in North Kashmir, represents a vital genetic and cultural resource, particularly for the 'Dardi' tribal community. Gurez sheep are the heaviest breed in Jammu and Kashmir, distinguished by their robust build, white coat with occasional brown or black hues, and coarse, hairy fleece. They yield approximately 1.25-1.5 kg of medium-fine wool annually, suitable for carpets and winter apparel. Exhibiting strong seasonal breeding behavior from September to October, these animals are well-suited to alpine grazing in summer and stall-feeding during winter. Their dual-purpose utility in wool and meat makes them central to the rural economy. However, ongoing crossbreeding efforts aimed at improving wool quality threaten their genetic integrity. Preservation strategies, including systematic characterization and documentation of their phenotypic and genotypic traits, are critical for safeguarding this valuable breed and supporting the livelihood of local communities.

Introduction

Sheep play major role in the livelihood of farmers by providing cash through sale of milk, meat wool etc. (Lateef et al., 2005) and nutritional security and insurance (Sharif et al., 2011). The production potential of different sheep breeds varies (Baneh et al., 2013) and depends upon the genetic makeup and the environment in which they are raised (Gupta et al., 2015). The production potential of cross breeds and exotic sheep is high as compared to native breeds (Rather et al., 2022). However, the locally adapted native breeds although possessing a low absolute production potential but often productivity presents a favourable shift if the management inputs are improved (Sarang et al., 2024). Further, the native breeds are important assets as they even produce under extreme environmental conditions and have developed over a long period of time (John et al., 2024). The native breeds are managed under low inputs, which is a critically an important characteristic, since rural population involved in livestock rearing in developing world cannot sustain high input-high output systems (Fasil et al., 2024). The native breeds also possess adaptability traits but absent in exotic breeds of sheep. Jammu and Kashmir is

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rich repository of sheep genetic resources (Singh & Malik, 2025). However, due to continuous and indiscriminate cross breeding for improving wool traits, all sheep breeds of J&K in general and Gurez in particular are under constant threat of extinction. Gurez is well known, registered breed of sheep limited to Gurez area of Bandipora district only (Manzoor et al., 2022). The breed is well adapted to the local agro-climatic and management conditions of the area and is reared mainly by the 'Dardi' tribe (Ganai et al., 2010). The animals of this breed have distinct physical, productive and reproductive characteristics. With this background the present article, therefore, explores the status of Gurez sheep in its breeding tract (Altaf et al., 2025).

Importance of indigenous breeds

In general, indigenous breeds provide the necessary genetic diversity required to ensure stability of modern agriculture production system (Rather et al., 2020b). Further, native genetic resources are vital building blocks for future livestock production system. As such, conserving them is important, not only for the communities who keep the animals but also for the future agriculture production system. As the native breeds in developing countries have low absolute production figures but often productivity turns out to be high if the production environment and the level of input are taken into consideration (Giller et al., 2021). Indigenous breeds produce and reproduce despite under harsh environmental conditions and are, therefore, considered important assets (Ganai et al. 2016). The productive and reproductive performance under harsh environment may be due to valuable adaptive traits developed over a period century. These traits are critically important since the vast majority of the world cannot sustain high input-high output systems (Oke et al., 2025). It is well-known that the livestock rearing provides nutritional security and insurance to the farmer during periods of crisis due to crop failure (Sharif et al., 2011). In addition, a rich source of nitrogen, phosphorus and potash present in the droppings/dung of livestock improves the soil fertility (Rather, 2019b). The AnGR represent a repository of allelic arrangements, rare or absent in the selected breeds and they can also be effectively associated to typical products helping farmers manage and protect the environment (Rather et al., 2020a). The native breeds are also a source of genetic material for research purposes (Rather et al., 2020a). Further, crossbreds fail to exploit their genetic worth and production level goes down after F_1 stage, so to produce F_1, we need native breeds to harvest hybrid vigor. Native breeds also supply germplasm for the improvement of cross breeds (Rather et al., 2020a).

Breeding tract of Gurez sheep

The breeding tract of Gurez sheep is of alpine (mountainous) type, located between longitude 74°40′ to 74°90′ E and latitude 34°15′ to 34°45′ N at a distance of around 130 Km from Srinagar, in district Bandipore across Razdan pass at an altitude 11672 ft above msl (Lone et al., 2013; Shah et al., 2017). The altitude of Gurez valley ranges between 2460 to 3900 m above mean sea level and extends over an area of 362.88 sq. km (Khan et al. 2013). Gurez valley remains totally cutoff from the Kashmir valley during winter season for 4-5 months (Shah et al., 2017). The pastures in Gurez had rivulets or brooks and stream flowing down from the melting snow and glaciers (Mir et al. 2025). The average temperature of 7.88°C with -9.02°C (January) to 32.43°C (July) has been reported in Gurez. Loamy type soil with high silica contents was reported by (Ganai et al. 2010) in Gurez valley.

Management

Gurez sheep is managed on low input low output system. The alpine (mountainous topology) type pastures of Gurez area provide enormous grazing field for sheep. The sheep are reared using grazing alone from summer to autumn (Ganai et al., 2010). From late spring to mid-autumn, sheep are managed on grazing only. However, during winter, sheep are only stall-fed and semi-stall-fed during early spring and late autumn. The sheep are migrated to highland pastures during summer. However, in many villages of Tulail, sheep are migration is not practiced but grazing in fields surrounding the villages in the radius of 3 to 4 km is carried. The sheep were migrated back to low land in autumn and graze in the surrounding villages in the radius of 3 to 4 km where the topology of the grazing area is mountainous too. The animals are reared using a mixture of stall feeding, semi-stall feeding and grazing alone. In the extreme winter (December to March), sheep are totally stall-fed, in April semi-stall fed, and in the summer till late autumn they are kept on grazing alone (Ganai et al., 2010). However, in Gurez region, animals are taken to highland pastures on community basis without hiring any shepherd. Under this community-based system, few sheep rearers in the locality are entrusted with the job of moving the sheep flock of entire locality to highland pastures for a specific period. After completion of their turn, these are replaced by other sheep farmers in the locality and so on.

Feed and fodder

Cultivated oats, maize, natural pastures, forest lands, community lands, common property resources, tree leaves and maize are main fodder resources of the Gurez region/sheep (Khan et al., 2013). Fodder comprised of crops, fodders and grasses available in forest lands and common property resources is harvested for hay making during summers for feeding during lean months. This is one of the priority activities of the livestock owners. Concentrate feeding is limited and only very few well-off livestock owners purchase wheat straw, bran and cakes from outside the Gurez for supplementation during lean months only (Khan et al., 2013).

Phenotypic characteristics of Gurez breed

The Gurez is a coarse woollen dairy breed, largest of the sheep breeds in J&K. The predominant colour of this breed is white, however, some animals are brown, grey (Anonymous, 2024) or black or even have brown or black spots. The animals are usually polled, however, horned and animals with more than two horns (poly-ceros condition) are also reported (Anonymous, 2024). Ganai et al. (2010) reported that these sheep have horizontal ears of varying length, ranging from rudimentary type (in about in 4% sheep) to long ears. Wattles have been also reported in 5% of Gurez population (Ganai et al., 2010).

Conformation

Gurez sheep exhibit a compact body structure at birth, with males and females having similar body lengths (26.38 cm and 26.26 cm, respectively). The length at girth is slightly higher in males (33.96 cm) compared to females (33.79 cm), suggesting a marginally more developed chest and rib cage in males. Males are also slightly taller than females at birth, with a height at wither of 24.81 cm compared to 24.48 cm in females. As the sheep grow, they undergo rapid development, with significant increases in body length, length at girth, and height at wither. By 3 months, males have a body length of 45.37 cm and females 45.03 cm, while the length at girth and height at wither also show substantial growth. At 6 months, females seem to have slightly larger body measurements than males in some traits, but the differences are minimal (Ganai et al., 2010). By over 1 year, Gurez sheep have developed into sturdy individuals with well-proportioned bodies. Males have a slightly longer body length (60.24 cm) and height at wither (57.99 cm) compared to females (59.94 cm and 57.34 cm, respectively) (Ganai et al., 2010). However, both males and females have similar length at girth measurements (67.93 cm and 67.90 cm, respectively), indicating comparable body proportions (Ganai et al., 2010). Overall, Gurez sheep exhibit a robust body conformation, suitable for their breed characteristics. The subtle differences in body conformation between males and females are notable, but both genders follow similar growth patterns. The rapid growth and development in the first year of life highlight the importance of optimal nutrition and management practices to ensure the sheep reach their full potential. With their compact and sturdy build, Gurez sheep are well-suited for a hilly topography.

Gurez is the largest of the sheep breeds in J&K. Generally, white in colour, although some animals are brown or black or have brown or black spots. A small proportion of the animals have small, pointed horns (Rather et al., 2021). Tail is thin and short. Fleece is generally coarse and hairy. Ears are long, thin and pointed (Ganai et al., 2010).

Production potential

Gurez breed produces on average 1.25 to 1.5 kg of course wool annually having fibre diameter, staple length, crimps per inch (CPI) and Medullation of 28.31±0.17 (Range 23.18 to 43.44), 4.48±0.07 (Range 1.75 to 10.00), 5.37±0.10 (range 1.75 to17.00) and 9.29±0.39 (range 0.13 to45.21), respectively (Ahanger et al., 2020). However, Ganai et al. (2010) reported average wool production from males and females as 311.12±15.41 and 289.55±9.21 g; 450.31±12.56 and 458.31±9.10 g; 31.96±10.96 and 528.75±7.29 g, respectively, at 0–6 months, 6–12 months and 1 year of age and above. Ganai et al. (2010) reported the staple length and fibre length in females as 4.96±0.11 cm and 6.92±0.23 cm and in male animals as 4.62±0.14 and 6.86±0.29 cm, and crimpiness of 1.52±0.11 (males) vs 1.47±0.06% (females) (Rather et al., 2021: Ganai et al., 2010).

Body weights

Body weights (kg) of 2.54±0.02, 8.73±0.08, 21.28±0.25 and 28.60±0.28 in males and 2.47±0.01, 8.70±0.05, 21.54±0.19 and 28.59±0.19 in females at birth 3 months, six months, and yearling age, respectively were reported by Ganai et al. (2010). This breed is popular for its meat and fibre suitability for making apparel or carpet. In addition to these, it also provides little amount of milk. With continued crossbreeding and negligence, we may lose this precious native germplasm.

Reproduction traits

Ganai et al. (2010) reported like all sheep of the hilly and mountainous regions, there was marked seasonality in the reproductive behaviour of Gurez sheep. The sheep exhibited estrus during April-May or September-November (Rather et al., 2021). However, the major breeding season was September- October. Only natural mating is practiced in Gurez sheep and one ram is allotted to 40–50 ewes for breeding. Normally, flock mating is practiced and a village sheep flock varies between 150 and 300 animals. The average age at first mating for male is 1.5 years, whereas it is 1.5 to 2 years in females. The estrous cycle lasts for 18 to 22 days with duration of 24 hours (Rather et al., 2021). The majority of the animals lamb during March -April. The age at first lambing varied from 2 to 2.5 years (Rather et al., 2021; Ganai et al., 2010). The average litter size is 1.06. On an average, the ewes bred 6 to 7 times in their lifetime.

Disease prevalence

The commonly observed diseases of Gurazi sheep are bacterial and parasitic in origin, like pneumonia, diarrhoea, small pox, fascioliasis, haemonchosis, dicrocoeliasis etc. (Masoodi et al., 2025). Department of Sheep Husbandry of Jammu & Kashmir carries vaccination against sheep pox, FMD, PPR and clostridial diseases besides dosing with anthelmentics and dipping against mange and ectoparasites. Recently, Shanaz et al., (2024) reported sero-prevalence of 7.89% in clinically healthy Gurez sheep using competitive enzyme-linked immunosorbent assay (C-ELISA).

Mortality

Ganai et al. (2010) in Gurez sheep reported lamb mortality of 4.76% at 4 months age, 3.62% in lambs from 4 to 12 months age. The mortality is significantly lower than Kashmir Merino. Rather et al. (2020b) and Bashir et al (2020) in Kashmir Merino sheep reported high mortality of 18.43±2.17% and 28.02%, respectively.

Strengths

Gurez sheep demonstrate remarkable resilience and practicality for pastoral communities, particularly due to their adaptability to the harsh agro-climatic conditions of the Gurez valley, allowing them to thrive in extreme environments (Ahanger et al., 2020). Their unique genetic makeup contributes to distinctive physical, productive and reproductive traits, positioning them as a valuable indigenous genetic resource (Ganai et al., 2010). Managed efficiently under a low input–low output system, they are especially suitable for small-scale farmers with limited financial and infrastructural support (Khan et al., 2013). Furthermore, the breed exhibits commendable resistance to diseases like pneumonia and diarrhoea, although they remain vulnerable to other illnesses such as fascioliasis and haemonchosis, indicating a need for targeted healthcare strategies (Ganai et al., 2010).

Weaknesses

Gurez sheep face several weaknesses that hinder their broader utilization and long-term viability. Their restricted geographical distribution, being confined to the Gurez area of Bandipora district, poses significant challenges for conservation and expansion beyond this ecological niche (Ganai et al., 2010). Compounding this limitation is their poor wool yield; the breed produces coarse wool with low staple and fibre lengths, making it commercially less attractive in the textile industry (Ahanger et al., 2020). Additionally, the population of Gurez sheep is under serious threat due to cross-breeding practices and general neglect of conservation of Gurez sheep (Rather et al., 2020a). Their productivity is further affected by limited availability of feed and fodder, with concentrate feeding not commonly practiced, making nutritional deficiency a persistent concern for sustainable rearing (Khan et al., 2013).

Opportunities

Establishing a sheep breeding farm in the ecological niche of Gurez sheep and implementing open nucleus breeding system (ONBS) can help conserve and improve the breed (Rather et al., 2020a) along with providing incentives to farmers for rearing Gurez sheep can encourage conservation efforts and promote the breed's sustainability (Rahim et al., 2025). Further, purchasing superior rams from farmers and using them for breeding can help improve the breed's genetic makeup and productivity (Rather et al., 2020a).

Threats

Gurez sheep face several significant threats that could compromise their survival and genetic purity if not addressed promptly. Continuous cross-breeding with other sheep breeds poses a serious danger to the preservation of their unique genetic characteristics, increasing the likelihood of extinction and diminishing their value as a distinct indigenous resource (Rather et al., 2020a). Climate change further complicates the situation by impacting the breed's natural adaptability and reducing its productivity, especially in the high-altitude, fragile ecosystems of the Gurez valley (Khan et al., 2013). Adding to

these concerns is the lack of comprehensive documentation on the breed's traits and genetic profile, which not only hampers scientific research but also limits the development of effective breeding and conservation programmes tailored to their specific needs (Akhter et al., 2026).

Conservation policy for Gurez sheep

Conservation ensures that the farm animal diversity is being maintained for contribution to food production, agricultural production and productivity through strategic planning, and policies for future purposes. The loss of AnGR and in particular native breed means the loss of unique genes/gene combinations associated with adaptability and utilization of low-quality feeds (Rather et al. 2020a). Effective conservation of genetic resources is possible only if the FAnGR are recognized and documented adequately, and there is a full participation towards conservation efforts of communities keeping the animals, scientists and authorities concerned like Development Authorities, Universities, Animal and Sheep Husbandry Departments. The first and most important step for efficient conservation policy for animal genetic resources is the proper characterization (phenotypic and molecular) to assess within and between breed diversity followed by documentation and proper management (Lalit et al., 2017). Therefore, the authors recommend the following strategies for conservation and sustained management of Gurez sheep. The breed should be studied and characterized to access within breed variability. The breed will be conserved and improved genetically through open nucleus breeding system (ONBS). Therefore, a sheep breeding farm should be established in its ecological niche under ONBS to improve and make the breed self-sustaining. The cross breeding should be stopped in Gurez valley. The farmers should be encouraged through incentives for rearing the breed. Further, superior rams should be purchased from farmers at younger age (which otherwise are used from mutton production) from farmers and used to improve the breed.

Conclusion

Gurez sheep is an important indigenous breed of Jammu and Kashmir, well adapted to the harsh climatic conditions, high-altitude pastures, and low-input management systems of Gurez Valley. Its robust body conformation, meat-producing potential, and coarse wool contribute significantly to the livelihoods of the local Dardi community. However, indiscriminate crossbreeding, limited geographical distribution, inadequate nutritional resources, and insufficient conservation efforts threaten its genetic integrity and long-term survival. Systematic phenotypic and molecular characterization is essential to assess its genetic diversity and identify valuable adaptive traits. Establishing a sheep breeding farm in its native tract, implementing an open nucleus breeding system (ONBS), conserving superior breeding rams, and providing incentives to farmers can support sustainable breed improvement. Collaborative efforts involving local communities, researchers, universities, and animal husbandry departments are crucial for effective conservation. Integrating genetic conservation with improved nutrition, healthcare, and sustainable breeding practices will help preserve Gurez sheep as a valuable genetic resource while strengthening the livelihoods of traditional sheep-rearing communities.

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Conflict of Interest

The authors declare that there are no conflicts of interest regarding the publication of this article.

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