

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

Olympica Sarma¹, Mubashir Ali Rather², and Vikrant Dalal¹

¹Assistant Professor, Department of Animal Genetics and Breeding, Sanskaram College of Veterinary and Animal Sciences, Sanskaram University, Haryana, INDIA

²Senior Epidemiologist, Diseases Investigation Laboratory, Nowshara, Srinagar, Kashmir, INDIA

*Corresponding Author: olylucky15@gmail.com

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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.

Keywords: Crossbreeding, Conservation, Gurez, Safeguarding.

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 (Rather *et al.*, 2020a). 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. The native breeds also possess adaptability traits but absent in exotic breeds of sheep. Jammu and Kashmir is rich repository of sheep genetic resources (Rather *et al.*, 2019a). 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. 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.

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. 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. 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 F₁ stage, so to produce F₁, 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 (Ganai *et al.* 2010). 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 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 (Ganai *et al.*, 2010). 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. Tail is thin and short. Fleece is generally coarse and hairy. Ears are long, thin and pointed (Rather *et al.*, 2021; 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 to 17.00) and 9.29 ± 0.39 (range 0.13 to 45.21), 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 $1.47 \pm 0.06\%$ (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. (Ganai *et al.*, 2010). Department of Sheep Husbandry of Jammu & Kashmir carries vaccination against sheep pox, FMD, PPR and clostridial diseases besides dosing with anthelmintics 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 $18.43 \pm 2.17\%$ 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 (Ganai *et al.*, 2010). 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 (Rather *et al.*, 2020a). 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 (Rather *et al.*, 2020a).

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 (Rather *et al.*, 2020a). 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.

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Contribution by Authors

All the authors contributed equally to writing the manuscript. The final manuscript was read by all authors and consented to publication.

Conflict of Interests

There is no conflict of interest.

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