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Village-based indigenous goat production systems in Assam: Socio-economic condition of farmers and sustainable management practices

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Abstract

The present study was undertaken to characterize the village-based indigenous goat production systems of Assam with special emphasis on the socio-economic characteristics of goat keepers, sustainable management practices of two major native goat populations. A comprehensive field survey was conducted in the native breeding tracts of Dhemaji, Golaghat, Kamrup (Rural), Lakhimpur, Morigaon and Nalbari districts of Assam. The average flock size was 4.2 animals in black coated goats, while 3.5 animals in brown coated goats. The goats depended primarily on natural grazing and locally available fodder trees. The goats depended primarily on natural grazing and locally available fodder trees, while concentrate supplementation and artificial insemination were absent under field conditions. Natural mating was practiced exclusively, and goats were maintained under simple village housing systems. Morphological characterization indicated that native black goat is distinguished by its uniform black coat and wider geographical distribution, whereas indigenous brown goat possesses a uniform brown coat, deer-like appearance and comparatively localized distribution. The study demonstrated that indigenous goat production in Assam represents a sustainable, low-input livestock production system that supports rural livelihoods while conserving valuable adaptive genetic resources. The phenotypic distinctiveness provides a scientific basis for their characterization, conservation, genetic improvement and future breed registration, thereby contributing to the sustainable utilization of indigenous goat genetic resources in the region.

Keywords: Indigenous goat, socio-economic status, sustainable management practices, Assam

Introduction

Goat farming constitutes one of the most important livelihood activities for rural households, particularly among marginal, smallholder, and landless farmers in developing countries. Because of their low capital requirement, rapid reproductive rate, early maturity, and high market demand, goats provide an accessible and sustainable source of income for economically disadvantaged communities. Consequently, goat husbandry contributes significantly to poverty alleviation, nutritional security, employment generation, and financial resilience in rural areas [1, 2, 3]. Women and elderly family members actively participate in goat management, making the enterprise an important source of income generation and empowerment in rural communities [1, 4, 5]. The state of Assam possesses a substantial indigenous goat population that is predominantly managed under traditional low-input production systems. Goat husbandry in the region is closely integrated with crop farming, where animals utilize naturally available vegetation and agricultural by-products without competing directly with human food resources. The majority of farmers maintain small flocks primarily for household consumption and supplementary income rather than commercial production. Thus, goats serve as an important component of livelihood diversification and risk management for rural families in the flood-prone agro-ecosystems of Assam. The goats are reared under extensive or semi-extensive systems, grazing freely on community grazing lands, roadside vegetation, riverbanks, forest margins, harvested crop fields, and fallow lands. Preventive healthcare measures, including vaccination, deworming, and veterinary interventions, are practiced inconsistently because of limited accessibility, inadequate awareness, and financial constraints [2, 3].

Despite these limitations, indigenous goats maintained under field conditions exhibit remarkable adaptability to the humid subtropical environment of Assam. The adaptive characteristics make local goats highly suitable for climate-resilient livestock production and sustainable farming systems in northeastern India [6, 7]. A comprehensive understanding of existing management practices and the socio-economic importance of indigenous goats is essential for designing effective breeding and conservation programmes. Such baseline information facilitates the formulation of community-based breeding programmes, conservation strategies, and policies aimed at improving productivity. Therefore, documenting field management practices is an indispensable component of sustainable livestock development and genetic resource conservation.

Materials and Methods

Study Area

The study was conducted in the native breeding tracts of Dhemaji, Golaghat, Kamrup (Rural), Lakhimpur, Morigaon and Nalbari districts of Assam., which are known for significant goat populations.

Sampling Design

A multistage random sampling technique was adopted. Three districts were selected based on the concentration of indigenous goats. From each district, villages were randomly selected and goat-rearing households were identified. A total of 796 households were surveyed.

Data Collection

Primary data were collected through structured questionnaires, personal interviews and field observations. Information collected included socio-economic characteristics of farmers, flock size and composition, feeding practices, housing management, breeding methods and kid rearing practices.

Statistical Analysis

Data were compiled and analysed using descriptive statistics such as mean, percentage and frequency distribution following the procedures described by Snedecor and Cochran [8].

Results

The housing management was entirely traditional, with animals generally sheltered only under simple village housing structures without specialized housing facilities

(Fig. 1). The breeding was exclusively through natural mating (100%), and artificial insemination was not practiced. Overall, both populations were maintained under extensive, low-input management systems relying largely on locally available feed resources and indigenous knowledge. In the current study two distinct indigenous goat populations of Assam, black-coated type and brown-coated type were identified under traditional production systems (Fig. 2). Both the populations have been reared by rural farming communities since time immemorial and are primarily maintained under low-input, extensive management practices. The native black goats were characterized primarily by their distinctive black coat colour and compact body conformation. They are locally known as *Krishna* due to the blackish colour. The behavioural observations in the brown goats were comparatively docile and exhibited alert, deer-like movements, which probably contributed to the origin of the local name *Kopilee* or *Pohu sagoli*.

The black coated goat is predominantly distributed in the districts of Nalbari, Kamrup (Rural) and Lakhimpur, with an estimated distribution area of approximately 7, 619 km², although the breed is found sporadically throughout the state. According to the 20th Livestock Census [2019], its estimated population was 7.94 lakh. In contrast, brown coated goat is mainly distributed in Golaghat, Morigaon, Kamrup (Rural) and Lakhimpur districts, occupying an estimated distribution area of 3, 998 km², with a population of 2.94 lakh. The average flock size varied from 4 to 10 animals (mean 4.2) in native black goats and 2 to 5 animals (mean 3.5) in indigenous brown goats. The flock composition was similar in both populations, comprising approximately 37.5% breeding does, 12.5% breeding bucks and 50% kids, indicating a production system primarily oriented towards breeding and meat production.

The feeding management of both populations was almost identical. The goats were predominantly maintained under extensive grazing systems, utilizing natural vegetation. The major browse species included jackfruit (*Artocarpus heterophyllus*), subabul (*Leucaena leucocephala*), Dimaru (*Ficus hispida*) and Kanchan (*Bauhinia variegata*), while important fodder grasses consisted of cowpea, teosinte, Deenanath grass and Rina grass. The concentrate feeding, mineral supplementation, cultivated fodders and dry fodder feeding were generally absent under field conditions. The kids were allowed to suckle their dams and gradually accompanied the flock for grazing.

The comparative general characteristics of black coated and brown coated goats are furnished in Table 1.

Table 1: Comparative general characteristics of native black coated and brown coated goats of Assam

Characteristic	Black coated goat	Brown coated goats
Coat colour	Black	Fawn or brown
Local synonyms	Krishna, Koli Sagoli	Kopilee, Pohu Sagoli, Mugi
Meaning of local name	Black goat	Brown goat, Deer-like goat
Native districts	Nalbari, Kamrup (R), Lakhimpur	Golaghat, Morigaon, Kamrup (R), Lakhimpur
Distribution area	7, 619 km ²	3, 998 km ²
Estimated population [2019]	7.94 lakh	2.94 lakh
Community	Local farmers	Local farmers
Average flock size	4.2	3.5
Production system	Extensive	Extensive
Feeding	Grazing-based	Grazing-based
Mating system	Natural service (100%)	Natural service (100%)
Utility	Chevon	Chevon



Fig 1: Diverse housing systems practiced by native goat farmers in different districts of Assam



Fig 2: The two distinct indigenous goat populations of Assam, black-coated type and brown-coated type

Discussion

The present investigation identified two distinct indigenous goat populations of Assam, which are differentiated primarily by coat colour, geographical distribution and certain behavioural characteristics, while sharing similar management practices. These observations are consistent with the general pattern reported for indigenous goat genetic resources in India, where geographically isolated populations often exhibit distinct phenotypic characteristics despite being maintained under comparable production environments^[9, 10]. Both the populations were maintained under extensive, low-input production systems with exclusive dependence on natural grazing, minimal external inputs and natural mating. Such production systems are characteristic of indigenous goat production across eastern and northeastern India, where goats are primarily raised by resource-poor smallholders under scavenging or extensive grazing conditions.^[4, 11] Similar management practices have also been reported for Assam Hill Goat, Black Bengal and other indigenous goat populations of eastern India, highlighting their adaptation to traditional village production systems^[12].

The relatively small flock sizes recorded in the present study agree with observations from other indigenous goat production systems in India, where flock size is generally limited by household labour availability, grazing resources and landholding size^[13].

Goats are well known for their capacity to efficiently utilize shrubs, tree leaves and diverse forage species that are generally unsuitable for other livestock species. Such feeding behaviour enables them to survive seasonal fluctuations in feed availability and contributes significantly to the sustainability of low-input livestock systems^[14].

The exclusive use of natural mating observed in both populations reflects the prevailing breeding practices in rural Assam. Consequently, natural selection operating under field conditions may have played an important role in maintaining adaptation to local climatic conditions and disease challenges^[10]. However, prolonged indiscriminate natural mating without planned selection may gradually increase the risk of inbreeding and genetic dilution,

emphasizing the need for community-based breeding programmes for sustainable genetic improvement^[15].

The most distinctive phenotypic difference between the two populations was coat colour. The coat colour is among the most heritable qualitative traits and has traditionally been used as an important criterion for breed identification in goats. Besides its cultural significance, coat colour may also influence thermoregulation, camouflage and farmers' selection preferences under specific production environments^[16]. The phenotypic characterization studies conducted across indigenous goat breeds have consistently demonstrated that external morphological traits provide reliable baseline information for breed identification, especially when combined with morphometric and molecular characterization^[17].

The behavioural characteristics observed in native brown goats, particularly its docile temperament and deer-like movements, are noteworthy because behavioural traits are often maintained through long-term farmer selection and adaptation to local environments. The indigenous communities frequently assign local names based on easily recognizable behavioural or morphological attributes, which often reflect valuable adaptive characteristics preserved through generations^[9]. Overall, the present findings indicate that these goats represent two well-adapted indigenous goat populations possessing distinct phenotypic identities while sharing common adaptive traits suited to the humid subtropical agro-ecosystems of Assam.

Conclusion

The present study demonstrated that the village-based indigenous goat production systems of Assam are deeply embedded in the socio-economic fabric of rural communities and are sustained through traditional, low-input management practices. The goats are predominantly reared by smallholder farmers under extensive production systems characterized by small flock sizes, dependence on natural grazing resources, exclusive natural mating and minimal use of external inputs. However, native black goats represent the predominant black-coated indigenous population with a wider distribution and larger population

size, whereas native brown goat is a comparatively localized brown-coated population distinguished by its deer-like appearance and docile temperament. These consistent phenotypic differences indicate the existence of two distinct indigenous goat populations maintained under similar village production environments.

The findings underscore the importance of indigenous goats as resilient livestock genetic resources that support sustainable rural livelihoods while conserving valuable adaptive traits through traditional farmer-led management. Therefore, systematic phenotypic and molecular characterization, community-based selective breeding, conservation initiatives and appropriate extension support are essential for the sustainable utilization and genetic improvement of these indigenous goat populations. The baseline information generated in this study provides a strong scientific foundation for breed characterization, official breed registration and the development of long-term conservation and genetic improvement programmes for the indigenous goat genetic resources of Assam.

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