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Phenotypic characterization of local goat breed in the Uttarakhand hilly tracts and its breeding constraints faced by smallholders

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Abstract

Local goat breed tracked in Kumaon region based mid Himalayas of Uttarakhand. Conducted survey results that breed were distribution in Khola and Gandhak villages of Dhauladevi block, Almora district. Total eighty two farmers have been registered, 260 adult female goats were tagged. Those farmers having very similar phenotypic characteristic Chaugarkha breed goats. Without tagging 536 adult females, 236 of adult males, and 160 kid's data were collected. Those tagged animals morphometric data were collected every month with equal intervals. We regularly recorded the birth weight, 3 month, 6 month and 9 month body weights of the tagged goats. For checking of general health and distribution of medicines, clinical and vaccination camp were organized periodically. The adult Local goat average body weight, body length, body height and chest girth are 22.00 ± 3.93 kg, 52.68 ± 3.93 cm, 59.07 ± 5.02 cm and 61.49 ± 4.38 cm in males and 18.08 ± 3.57 kg, 50.26 ± 3.70 cm, 53.81 ± 3.44 cm and 58.00 ± 3.78 cm in females. Socio-economic data were collected from farmers. We listed various constraints in Local goat breeding at its breeding track which may helpful for future Local goat breeding programs in the Uttarakhand.

Keywords: Breeding, local goat, meat production, phenotypic characterization

Introduction

Rise in population, escalating urbanization, income growth as well as increase in standard of living results in shifting of protein source from plants to animal results in an increasing demand for meat ^[1]. In India particularly northern Himalayan region, chevon production is higher in compared over others. Religious taboos on beef, utility of sheep for milk and fibre purpose results in less mutton production, less availability of fish and difficulties in poultry rearing due to cold environment all helped to make goat meat the most preferred and most consumed meat in Northern Himalayan regions of India. Besides a moderate shift in the consumption pattern from vegetarianism to non-vegetarianism is also helping increasing the demand for goat products. A higher demand on the one hand leads to opportunities for the goat sector ^[2, 3]. Smallholder goat producers which are often lacking sufficient genetic resources and scientific knowledge might limit their production capacity ^[4]. The improvement and conservation of superior goat genetic resources is a long term and continuous activity. The genetic improvement programme should be undertaken through structured and systematic manner specific to the area of evolution of the genetic resource ^[5, 6].

Method and Materials

Description of the study area

Himalayan goat unit, IVRI, Mukteswar, under All India Coordinated Research Project (AICRP) on Goat Improvement started in the year 2014 with the aim of improvement of local Himalayan goats at Kumaon hills of Uttarakhand. Local goats are mainly reared by small and marginal farmers for meat purpose. Two villages namely, Khola and Gandhak of Dhauladevi block in Almora district have been adopted as cluster-I. Total eighty two farmers have been registered and 260 adult breed able does were tagged as well as 61 kids were also included in the cluster-I. Chamdungra-Timta and Duni of Gangolighat block of Pithoragarh district have been identified as second cluster. A survey for third cluster has been completed in Lamgarha block of Almora district. All phenotypic and socio-economic data were collected through personal interview.

Collection of physical body characters

Visual observation was made and physical characters were recorded for 260 goats. Each goat was identified by its sex and age of the goats was calculated based on dentition. Age of the goats was grouped into 4 age group categories: under 1 year, 1 to 1.5 years, 2 years, 2.5 years and 3 years and above.

Collection of body measurements

Live body weight and other linear body measurements were measured using measuring tape for 260 goat breeds in the sampling sites. The goats were separated according to the sex and age before taking measurements. The linear body measurements were made using plastic measuring tape and live body weight of goats was measured using suspended spring balance.

Statistical analysis

Sex and age of the goats were fitted as independent variables and live body weight and linear body measurements were fitted as dependent variables. Statistical differences between quantitative variables of selected goats were analyzed using General linear model procedure (PROC GLM) of SAS 9.2, 2008. Least square means with their corresponding standard errors were calculated for each body trait over sex and age. The Duncan Multiple Range test was used to separate significance ($p < 0.05$) of least-square means.

The model fitted for analyses of body weight and other linear body measurements was:

$$Y = \beta_0 - \beta_1 X_1 + \beta_2 X_2 + e$$

Y = Dependant Variables (Body weight or linear body measurements)

β_0 = Intercept

β_1, β_2 = Partial regression coefficients

X_1 = Effect of sex group (0 – Male and 1 – Female)

X_2 = Effect of age group

e = Random residual error

Results and Discussion

Physical body characters of indigenous goat population

A physical body character of the goat population was shown in Table 1. Out of the total sample goat population (260 goats) male goats were 46% and female goats were 54%. Majority of the goat population 64% had straight head, 35% had slightly convex head and only 1% of the goats had slightly convex head. In the study area predominant ear type was pendulous and it was 74% and 25% was horizontal ear type. Goats in the study area had variety of coat colour such as white, black, brown and combination of these colours. Among them majority of the goats had white colour in their coat including the mixed coat colour type compared to plain black and brown coat colour. The goats which had only one coat colour (white or black or brown) were plain in coat colour pattern and the goats which had more than one colour had patchy and spotted coat colour pattern. Coat colour pattern of patchy was nearly half (54%) compared to plain and spotted coat colour pattern. Half (54%) of the goats had back horn orientation and 35% and 8% of the goats had rudimentary and front horn orientation respectively. Out of the total goat population 40% of the goats had wattle and 60% of the goats had no wattles. 26% of total male population contained bear and 74% of the goats had no bear. Majority of the goats in the study area had horns. 78% of goats had horns and 22% of the goats did not have horns. Presence of horns in indigenous goats is an important mechanism of self-defending.

Live body weight and linear measurements of indigenous goat population

Least square mean and standard deviation for sex and age effect on live body weight and linear body measurements are shown in Table 1. Males had 3.13 kg higher the body weight ($p < 0.05$) compared to female. Males had higher values for linear body measurements ($p < 0.05$) than female. These results were in agreement with the finding of Gelana and Asefa^[8]. in indigenous goats of South East Ethiopia. On the other hand these results were in contrast with the results of Jimmy *et al.* and Okbeku *et al.* who reported female goats had higher body weight and linear body measurements compared to male^[9, 10]. The variation in live body weight and other linear body measurements between males and females shows that these traits are sex dependant and the increase in live body weight and other linear body measurements with the age (0 PPI to 4 PPI) indicated that these traits are also age dependant^[6].

Table 1: Phenotypic measurements were taken by direct observation and ear tagging done by tagging machine.

Phenotype	Adult male	Adult female
Average body weight	22.08±3.54 kg	18.08±3.57 kg
Body length	52.68±3.93 cm	50.26±3.70 cm
Body height	59.07±5.02 cm	53.81±3.44 cm
Chest girth	61.49±4.38 cm	58.00±3.78 cm



Fig 1: Phenotypic measurements were taken by direct observation and ear tagging done by tagging machine.

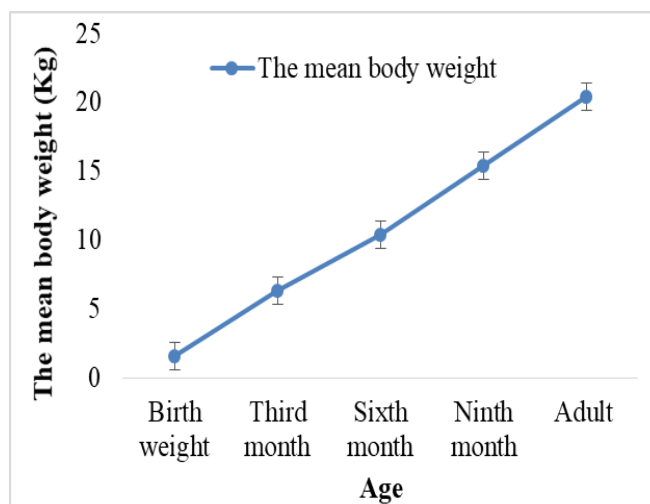


Fig 2: The mean of body weight

Disease resistance of local goat

As nutritional scarcity and parasitic infestations are predominant in this area, a comprehensive study has been made for controlling parasitic infection. A total of 166 faecal samples were collected and examined for parasitic infestation and anthelmintic resistance. The morphological studies revealed *Haemonchus contortus* and *Teladorsagia circumcincta* are predominant nematodes. Other notable parasites are *coccidia*, *Moniezia spp* and *Coenuruscerebralis* (Gid). Faecal egg count reduction test (FECRT) and Egg Hatch Test (EHT) revealed that strongly populations were highly susceptible to benzimidazoles, closantel and ivermectin. Allele specific PCR (AS-PCR) showed prevalence of benzimidazole resistance is less than 1% (<1%). The animal of the clusters are being monitored for regular health check-up, prophylaxis and treatment, as well as providing advisory services to the farmers. Six animal health camps, three meetings and two awareness camps were organized.

Constraints faced by smallholders in breeding

Major constraints faced by smallholders are non-availability of good quality breeding bucks. In Uttarakhand, majority of goats' keepers were smallholder with one or two goats per family. Such owners cannot afford to maintain breeding bucks. Adult does remain absence of offspring for long periods of time due to lack of breeding bucks nearby them resulting severe reduction in their income from the does. Some goat keepers were having larger flocks but they sale fast-growing male kids to butchers for their urgent need of money. Farmers don't know those fast growing kids were having genetically superior traits. Often the slow-growing stunted kids that get left behind end up in breeding with the does. Some farmers have a habit of keeping breeding bucks, does and male kids together in the same flock. Results accidental mating of very young doe's results in pregnancy leads to abort or their kids are stillborn or die soon after birth. This stress on the doe so debilitates it that it can never grow into a successful breeding animal. This phenomenon was not noticed in sheep flocks who keep rams and ewes together. Because ewes attain sexual maturity and exhibit oestrus at a slightly older age than does. The main constraint in the expansion of flocks with the small holders are lack in resources such as space, funds for investment and graze land especially during winter, as well as the lack of labour to look after additional animals. Inadequate access to health care, particularly vaccination, was another major constraint in goat rearing. The perception that goats are detrimental (browsing hobbit leads to destroying forest) to the environment has also had a negative impact on goat rearing and there are limited credit opportunities and loan schemes for goat farmers.

Conclusion

Removing the various constraints faced by goat keeper will pave a way for successful systematic breeding programme in Northern Himalayan regions of India. Removing the various constraints leads to development of new breed of Local goat with higher economic traits including the easy availability of guaranteed good quality animals. Many of the breeds that we have today have probably evolved from such cross-breeding by communities themselves. This study and compile the existing data from field may improve the future goat production in the Uttarakhand hilly regions.

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