

Influence of Rearing System on Body Condition Score and Mortality Rate of Black Bengal Goats

ABSTRACT

The aim of the study was to compare the body condition score of Black Bengal goats (BBG) of different age group reared under different rearing system and mortality rate between semi-intensive and intensive system under field condition. A total of 100 farmers were interrogated for fulfilling the parameters relevant to the purpose of current study. Age-wise classification of BBG were done into four groups, i.e., 1-3 month, 4-6 month, 7-12 month and 13-24 month of age to evaluate the body condition score among three rearing system. The present study found no substantial difference in the age group among 1-3 month, 4-6 month, 7-12 month of age managed under different system of rearing. However, a significant ($p < 0.05$) difference was found in the age group of 13-24 month between semi-intensive and intensive system of management. It was observed that goats managed under intensive system was higher in body condition score by 6.81 % when compared to semi-intensive system of rearing. With subject to mortality rate, the average no. of goats died per year was comparatively higher in semi-intensive (1.20 ± 0.10) than intensive (1.04 ± 0.09) system of rearing under field condition. However, the mortality rate showed no significant ($p < 0.05$) difference between the two system of rearing under field condition. From the current findings, it may be reported that the intensive system of rearing is better in terms of body condition score as well as minimizes the mortality rate of Black Bengal goat.

Keywords: Black Bengal goat, body condition score, mortality, rearing system

1. INTRODUCTION

Black Bengal goat (BBG) is the most valued, well known and dwarf-sturdy breed of goat commonly found in the Eastern parts of India and in entire Bangladesh. In India, Black Bengal goat is the most populated goat breed accounting for 18.6 % of total goat breed [2]. Goats are among the main meat-producing animals, and goat meat (chevon) has huge domestic demand, with no social, cultural, and religious restrictions in India. This breed provides certain management benefits because of its small size, tranquil nature, and low demand for housing [1,3,7]. The BBG is extremely adapted to harsh climate conditions and unusable ground where producing crops or raising dairy animals is unthinkable [13]. In many parts of the country, it was reported that a large number of goats are raised using a migratory system of management [6]. In rural areas, usually goat farmers let loose their goats unsupervised for grazing and the animals scavenge and subsequently, feed on farm or kitchen wastes. This type of rearing system ultimately led to poor growth and productivity of goats and thereby could not reach to desirable market size [5]. Adoption of different goat rearing systems can vary depending on the region, climate, available resources, and the goals of individual farmers. In some cases, farmers may prefer semi-intensive or extensive systems

due to cultural practices, land availability, or a desire to maintain traditional and sustainable farming methods. In India, majority (83.4 %) of the goat keepers are landless, small and marginal farmers having small or no land resource [11]. Body condition score (BCS) has been demonstrated to be a crucial practical instrument for determining the body condition of goats since it is the most basic predictor of the animal's fat reserves that it can use during times of high energy demand, stress, or inadequate nourishment [19]. Type of management system plays an important role and critically considered for successful goat husbandry in tropical countries [15]. Rearing system employed on a goat husbandry can significantly influence the susceptibility of diseases and subsequently affects the overall performance of the goats. To date, no such studies were reported from the sampling area with reference to the impact of different system of rearing on body condition score as well as the mortality rate of Black Bengal goats. Keeping the above points into consideration, the purpose of the study was undertaken to evaluate the effect of rearing system on BCS and mortality rate of Black Bengal goat depending on the rearing system.

2. MATERIALS AND METHODS

In this study, Nadia districts of West Bengal was selected for the survey purpose. Two blocks were selected viz. Kalyani and Chakdaha block from this district. The duration of the study period was six months. A door-to-door survey was carried out among the farmers of the selected villages through a pre-designed questionnaire to fulfil all the parameters pertaining to rearing system. Farmers were interviewed on their own property, and the respondent's verbal permission was obtained just prior to the interview. The questions were then asked to agreed farmers in a simple language, with explanations provided when appropriate. Accordingly, 100 respondents/farmers were interrogated. A total of 411 Black Bengal goats (young and adults) were used for the study purpose under field condition. The comparison of body condition score of BBG was done among intensive system of organized farm with farmer's rearing system (semi-intensive and intensive system) kept under field condition at farmer's level. Subsequently, we categorized the animals into four age group, 1-3 month, 4-6 month, 7-12 month and 13-24 month of age. A scale of 1-5 points was used for the determination of BCS (Table 1). For evaluation of mortality rate of BBG, the comparison was done between semi-intensive and intensive system of rearing under field conditions. Mortality rate was calculated as the number of goats died per year depending on the type of rearing systems. As a result, all the data were collected, entered and processed into the Microsoft excel and the analysis were done using ANOVA with the help of SPSS software version 26.0. The level of significance was set at $p < 0.05$.

Table 1. Descriptions of body condition score [4]

Score	Descriptions
BCS1	Spinous processes (SP) are sharp and prominent. Loin eye muscle is shallow with no fat cover
BCS2	Loin eye muscle has little fat cover but is full
BCS3	SP are smooth and rounded, and one can feel individual processes with pressure, loin eye muscle is full with some fat cover.

BCS4	SP can be detected only with pressure as a hard line, traverse processes cannot be felt and loin eye muscle is full with a thick fat cover.
BCS5	It is impossible to detect SP, and the loin eye muscle is very full with thick fat cover.

3. RESULTS AND DISCUSSION

3.1. Effect of rearing system on BCS

The body condition score of different age group under different system of management are represented in Table 2 & Fig 1, respectively. From the present study, it was observed that there was no significant ($p < 0.05$) difference in body condition score at age group of 1–3 months. The overall mean of different system of management was 2.68 ± 0.07 . Similarly, body condition score at age group of 4–6 months was found non-significant ($p < 0.05$). Likewise, it also indicated that BCS of 7–12 age group did not differ significantly ($p < 0.05$). However, a significant ($p < 0.05$) difference was found in the age group of 13–24 month between semi-intensive and intensive system of management (Fig 1.). The current study showed that goats managed under intensive system was higher in body condition score by 6.81 % when compared to semi-intensive system of management.

Body condition score (BCS) is directly proportional to the live body weight and body measurements of goats [9,16,17]. In our study, goats managed under intensive system had comparatively higher and healthy body condition score whereas goats reared under semi-intensive system of management were thinner and smaller than the former system. Our result is in agreement with those of [18], who reported that dairy goats maintained under intensive system have regular and higher body condition score than that of semi-intensive system of rearing.

Table 2. Body condition score (BCS) of different age group under different system of management (Mean $\pm$ S.E.)

Age group (month)	Semi-intensive under field condition	Intensive under field condition	Intensive under farm condition	Overall	F value	P value
1-3	2.58 ± 0.12	2.65 ± 0.11	2.80 ± 0.10	2.68 ± 0.07	4.432	0.330
4-6	2.67 ± 0.10	2.89 ± 0.07	2.71 ± 0.09	2.76 ± 0.05	0.581	0.137
7-12	2.75 ± 0.69	2.84 ± 0.56	2.82 ± 0.59	2.80 ± 0.35	2.035	0.561
13-24	$2.79^a \pm 0.06$	$2.91^b \pm 0.04$	$2.98^b \pm 0.02$	2.90 ± 0.02	1.130	0.014

Row wise means with different superscripts (a, b) differ significantly at $P < 0.05$

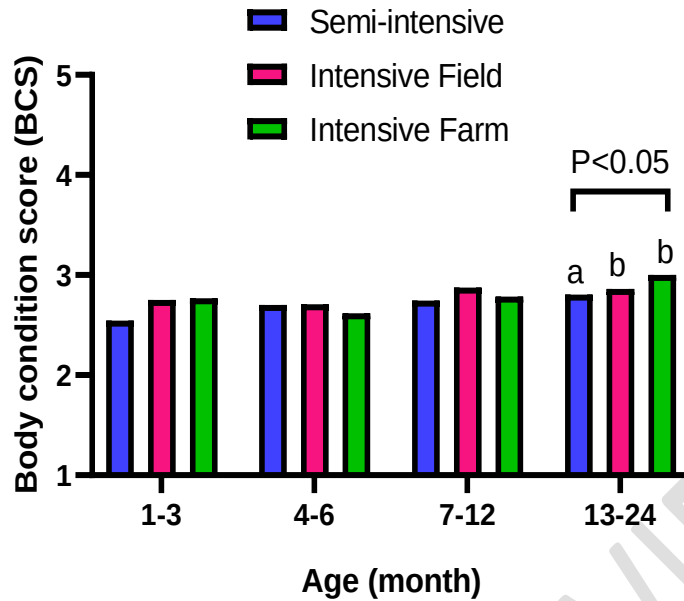


Fig- 1: Body condition score of semi-intensive, intensive field and intensive farm (organized farm) of different age group

3.2.Goats died per year under field conditions

The present survey data indicated that the average no. of goats died per year was comparatively higher in semi-intensive (1.20 ± 0.10) than intensive (1.04 ± 0.09) system of rearing under field condition (Table 3). The overall mean value is 1.12 ± 0.70 . The current study showed that the minimum and maximum number of goats died per year is 1 and 4 respectively. In a study conducted by [8] reported that approximately 10.0 % of animals die in a year as a result of diseases. Another research study by [10] revealed that goats under semi-intensive production systems experienced severe stress, which results in higher incidence of diseases and ultimately causing dead of the animal, which corroborates the present study. However, low rates of death were seen in goat kids raised in an intensive system, which is likely due to adoption of good management techniques [12]. According to [8], the rainy season was the worst period in the year with the most deaths among goat kids, having a mortality rate of 28.9 %.

Table 3. Average number of goats died per year under semi-intensive and intensive system of rearing under field condition (Mean $\pm$ S.E.)

Rearing system	Mean $\pm$ S.E.	Min.	Max.	F value	P value
Semi-intensive	1.20 ± 0.10	1	4	1.390	0.241*
Intensive	1.04 ± 0.09	1	2		
Overall	1.12 ± 0.70	1	4		

*Non-significant

4. CONCLUSION

From the present study, it can be concluded that rearing system had significant effect on body condition score and mortality rate of Black Bengal goat. As a result, it was noted that intensive system of rearing is a suitable and favourable method for raising Black Bengal goats under modern farming conditions.

REFERENCES

1. Amin, M. R., Husain, S. S., and Islam, A. B. M. M. (2001). Reproductive peculiarities and litter weight in different genetic groups of Black Bengal does. *Asian-Australian Journal of Animal Sciences*, 14, 297-301.
2. BAHs, (2022). Basic Animal Husbandry Statistics. Department of Animal Husbandry, Dairying & Fisheries, New Delhi, India.
3. Biswas, S., (2010). The Black Bengal Goat as a tool to promote sustainable livelihoods in rural west Bengal. Food policy for developing countries: the role of government in the global food system. Case study, 7–10.
4. Cimen, M., and Topcu, H. (2013). Effect of body condition score on biochemical milk parameters having economic importance in dairy goat during the first month of postpartum period. *International Journal of Agriculture and Biology*, 15(2), 395-397.
5. De Vries, J. (2008). Goats for the poor: Some keys to successful promotion of goat production among the poor. *Small Ruminant Research*, 77(2-3), 221-224.
6. Debbarma, N., Samanta, A. K., Dhara, K. C., Debnath, T., Singh, V., and Haldar, A. (2018). Performance of growing Black Bengal goats under different management systems of rearing. *Journal of Animal Research*, 8(4), 633-641.
7. Devendra, C., and Burns, M. (1983). Goat production in the tropics. Commonwealth agricultural Bureaux. *Farnham Royal Bucks England*, 13(7), 51-57.
8. Ershaduzzaman, M., Rahman, M. M., Roy, B. K., and Chowdhury, S. A. (2007). Studies on the diseases and mortality pattern of goats under farm conditions and some factors affecting mortality and survival rates in Black Bengal kids. *Bangladesh Journal of Veterinary Medicine*, 5(2), 71-76.
9. Eydurán, E., Zaborski, D., Waheed, A., Celik, S., Karadas, K., and Grzesiak, W. (2017). Comparison of the predictive capabilities of several data mining algorithms and multiple linear regression in the prediction of body weight by means of body measurements in the indigenous Beetal goat of Pakistan. *Pakistan Journal of Zoology*, 49(1), 257-265.
10. Hasan, M. J., Ahmed, J. U., and Alam, M. M. (2015). Reproductive performances of Black Bengal goat under semi-intensive and extensive conditions at rural areas in Bangladesh. *Journal of Advanced Veterinary and Animal Research*, 1(4), 196-200.
11. IFAD, (2018). International Fund for Agricultural Development. <https://www.ifad.org/documents/38714174/40260862/Building+a+vibrant+goat+sector+approach+paper+for+vision+2030.pdf/e9ff614b-7d81-4778-a755-c7a0ae1f121b>
12. Islam, A. F. M. F., Nahar, S., Tanni, T. S. J., Hoque, M. A., and Bhuiyan, A. K. F. H. (2016). Breeding And Production Performance Profile of Black Bengal Goats in Rural Areas of Mymensingh in Bangladesh. *Bangladesh Journal of Animal Science*, 45(2), 46-51.

13. Jat, G. R., Datt, M., Bhateshwar, V., and Fogya, S. L. (2018). Factors affecting birth weight in Sirohi goat kids. *International Journal of Current Microbiology and Applied Sciences*, 7(5), 2627-2631.
14. Mandal, D. K., Karunakaran, M., Debbarma, A., Swain, S. K., Santra, A., Dutta, T. K., Chatterjee, A and Rai, S. (2022). Black Bengal goat husbandry-An appraisal of productive and reproductive performance under intensive management system. *Journal of Livestock Science*, (13).
15. Mandal, D. K., Karunakaran, M., Debbarma, A., Swain, S. K., Santra, A., Dutta, T. K., and Rai, S. (2022). Black Bengal goat husbandry-An appraisal of productive and reproductive performance under intensive management system. *Journal of Livestock Science*, 13, 227-233
16. Mohsan, I., Haque, M. N., Ahmad, N., and Mustafa, H. (2019). Effect of dietary protein level on growth and body condition score of male Beetal goats during summer. *South African Journal of Animal Science*, 49(5), 900-903
17. Reshma, C. V., Anitha, A., Rao, S. J., and Muralidhar, M. (2022). Body condition score and its relation to body weight and measurements of local goats of Andhra Pradesh under field conditions. *International Journal of Bio-resource and Stress Management*, 13(2), 131-136.
18. Tiezzi, F., Tomassone, L., Mancin, G., Cornale, P., and Tarantola, M. (2019). The assessment of housing conditions, management, animal-based measure of dairy goats' welfare and its association with productive and reproductive traits. *Animals*, 9(11), 893.
19. Villaquiran, M., Gipson, T. A., Merkel, R. C., Goetsch, A. L., and Sahlu, T. (2004). Body condition scores in goats. *American Institute for Goat Research, Langston University*, 1-8.