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Effect of Different Rearing Systems on Body Weight Gain and Average Daily Gain in Berari Goats

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ABSTRACT: The present study was undertaken at the Department of Livestock Production and Management, Nagpur Veterinary College, Nagpur, and Punyashloka Ahilyadevi Sheep and Goat Farm at Bondri, Ramtek, Maharashtra, India, for a total duration of 91 days. For the study, 24 growing Berari goats of about six months of age were selected, and were divided into three groups, viz., Intensive group (T0), Semi-intensive group (T1), and Extensive group (T2) of goat rearing systems with eight goats in each group. The results revealed that the T0 Group (Intensive system) (22.08 ± 0.24 Kg) has a significantly higher ($p<0.01$) body weight than T2 (Extensive) (20.44 ± 0.34 Kg). Goats of T0 have non significantly higher body weight compared to T1 (20.50 ± 0.50 Kg), and goats of T1 group had significantly ($p<0.05$) higher body weight as compared to T2 group. The average daily gain for the T0 was 112.10 ± 2.96 gm, T1 94.81 ± 2.72 gm, and T2 77.77 ± 3.03 gm. The weight gain of the goats in the T0 was significantly ($p<0.01$) higher than T1. The daily weight gain was also significantly ($p<0.01$) higher in T1 compared to T2.

KEYWORDS: Berari Goats, Intensive, semi-intensive and Extensive Goat rearing systems, growth performance

1. INTRODUCTION

India has a rich diversity of farm animals, and goats hold a significant place due to their long association with human societies since domestication began nearly 10,000 years ago in the Fertile Crescent (Jayashree *et al.,* 2014). With 39 registered breeds, goats contribute greatly to India's rural economy, especially in vulnerable agro-climatic regions. Their adaptability to harsh, dry environments, ability to utilise diverse vegetation, and low maintenance needs make them ideal livestock for small and marginal farmers (Lata, 2021). Goats are a major source of meat, milk, manure, and income. They support rural livelihoods by providing quick financial returns, earning them the title "ATM" of farmers (Pandey *et al.,* 2015). India ranks first in goat milk production and is among the leading countries in goat meat output and export (APEDA, 2021). The 20th Livestock Census reports 148.88 million goats, making up 27.74% of India's total livestock. The rise in female goats (19.89%) indicates a growing emphasis on productivity and meat production.

Weight gain in goats depends largely on the production system. India commonly practices three systems—extensive, semi-intensive, and intensive each influencing feed intake, health, and growth. The extensive system allows goats to graze freely for 8–9 hours a day. While this meets maintenance needs, weight gain remains low because forage quality varies seasonally, and goats expend more energy in walking long distances (Lamani, 2019). The tethering system, a restricted grazing method, further limits nutrient intake and slows growth. The semi-intensive system, combining controlled grazing with stall feeding, offers improved nutrition through tree leaves, crop residues, fodder, and concentrates (Singh, 2018). This system strikes the best balance for smallholders, improving body weight gain due to regular supplementation and reduced energy expenditure in grazing. The intensive system provides the highest growth rates because goats are stall-fed with nutrient-rich, cultivated fodder and concentrate mixtures. This ensures consistent energy and protein intake essential for rapid muscle development, making it suitable for commercial meat farms (Lamani, 2019). However, it requires more investment. A major barrier to weight gain is gastrointestinal (GI) parasitism, which reduces feed efficiency and suppresses growth. Parasites often remain unnoticed until severe, reducing market weight and profit (Valentine *et al.,* 2007). Effective deworming and region-specific parasite management (Gwaze *et al.,* 2009), along with proper nutrition, are essential for achieving optimal weight gain.

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2. METHODOLOGY

The present study was undertaken at the Department of LPM, Nagpur Veterinary College, Nagpur, and Punyashloka Ahilyadevi Sheep and Goat Farm at Bondri, Ramtek, Maharashtra, India, for a total duration of 91 days (12 weeks and 14 observations). For the study, 24 growing Berari goats of about six months of age were selected, and the general health conditions of the goats were examined. The selected goats were divided into three groups, viz., Intensive group (T0), Semi-intensive group (T1), and Extensive group (T2) of goat rearing systems with eight goats in each group.

Table 1: Details of treatment for each group

Sr. No	Groups	No of animals	Feeding pattern	Rearing System
1	T0	8	Concentrate supplementation 1 % of body weight + 100 % roughages of requirement	Intensive
2	T1	8	Concentrate supplementation 1 % of body weight + 50 % roughages of requirement + 4 hours of grazing per day	Semi-intensive
3	T2	8	8 hours of grazing per day	Extensive

2.2 Body Weight Recording

The body weights of the growing goats were recorded using the digital weighing balance. The weighing of the animals was done in the morning before they were let out for grazing and offered feed. The body weights were recorded at weekly intervals and at the start and end of the experiment. It was expressed in kilograms.

2.3 Average Daily Gain

The average daily gain was calculated by using the following formulae.

$$\text{Average Daily Gain (ADG)} = \frac{\text{Bd Wt, at the end day of the week (Kg)} - \text{Bd Wt, on the start day of the week (Kg)}}{\text{No. of. days of the growth trail}}$$

3. RESULT AND DISCUSSION

3.1 Body weight

The body weights of the goats were recorded at weekly intervals, and the average, along with SE was calculated. The results are presented in Table 2.

From Table 2, it is stated that at the start of the experiment, the body weight of the goats did not vary significantly ($p<0.05$) among the experimental groups and by the end of the experiment, the body weight of growing Berari goats showed significant ($p<0.05$) variations. T0 (22.08 ± 0.24 Kg) has a significantly higher ($p<0.01$) body weight than T2 (20.44 ± 0.34 Kg) Goats of T0 have non significantly higher body weight compared to T1 (20.50 ± 0.50 Kg), and goats of T1 group had significantly ($p<0.05$) higher body weight as compared to T2 group.

The higher body weight of the intensive group is because they were provided with necessary nutrients containing the required amount of protein, which are utilised for the growth of the growing goats, whereas, in the extensive system, there was no idea about which nutrients the goats are getting during the grazing. The semi-intensive group receives concentrated feed along with grazing; thus, they have higher body weight than an extensive system. Additionally, the energy-saving impact of the goats not wandering for grazing had improved their condition.

The results of the study are in line with those of Patil *et al*. (2014), who found more body weight in the stall-feeding group of Osmanabadi goats as compared to the grazing group. Kochewad *et al.* (2017), Mahanthesh *et al*. (2019), Karthik *et al*. (2021),

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and Rangamma *et al.* (2023) also found that the mean body weight of the sheep maintained under an intensive system was better than the sheep maintained under a semi-intensive and extensive system. Given that the animals in the intensive system grow faster than the rural system, they opined further that it is expected that the intensive system animals have better reproductive performance.

The present experiment findings are at odds with those of Paramasivam *et al*. (2002), who discovered that the Barbari goats reared in the semi-intensive group had a body weight that was significantly higher than the goats reared in the intensive group, which was followed by the extensive group.

No earlier study was found where the animals in the extensive group had a higher body weight than the intensive group.

3.2 Average Daily Gain (gm)

The average daily gain of the goats was calculated and presented in Table 3. According to it the average daily gain in the experiment for the T0 was (112.10 ± 2.96 gm), T1 (94.81 ± 2.72 gm), and T2 (77.77 ± 3.03 gm). The weight gain of the goats in the T0 was significantly ($p<0.01$) higher than T1. Weight gain was also significantly ($p<0.01$) higher in T1 compared to T2.

The results of the study are in accordance with Bharambe and Burte (2012), Kochewad *et al*. (2017), Rangamma *et al*. (2023), and Farrag *et al*. (2019), who studied the different rearing systems on sheep observed higher body weight gain in the sheep reared in an intensive system than in a semi-intensive and extensive system.

Karthik *et al* (2021), observed that the average daily gain of the sheep reared intensively was higher irrespective of the growth period, this is similar to the result of the present study. He opined that the stress in the extensive system lowers the feed of the goats, also roaming of the goats for grazing leads to more intake of water and thus lowers feed consumption.

Debbarma *et al*. (2018), Mandal *et al*. (2022), and Debbarma *et al*. (2023) found that the goats in the intensive group show higher body weight than the extensive and semi-intensive groups their results are inconsistent with the results of the present study.

Paramasivam *et al*. (2002) found higher body weight gain in the semi-intensive groups as compared to intensive, followed by the extensive system, which was in contrast with the results of the present study.

This might be because, wherever the experiment was conducted and the pasture land containing various types of fodder trees and feed resources availed by the goats during partial grazing might have had higher nutritive values, particularly in terms of protein, and the cosy atmosphere would have supported the higher body weight gain.

To determine the effect of different rearing systems on body weight and average daily gain of the growing Berari goats, an analysis of variance was performed, and the results are presented in Table 4.

4. CONCLUSION

The present study concludes that the rearing system has a significant influence on the growth performance of growing Berari goats. Although the initial body weights of all groups were similar, the final body weight and average daily gain differed greatly among the treatments. Goats maintained under the intensive system (T0) recorded the highest body weight and daily gain, followed by those in the semi-intensive system (T1), while goats in the extensive system (T2) showed the lowest growth. This superior performance of the intensive group can be attributed to a consistent and balanced nutrient supply, reduced energy expenditure, and controlled feeding of essential nutrients such as protein, which support optimal growth. In contrast, goats under extensive grazing relied on variable and often inadequate forage resources, resulting in poorer weight gain. The findings are supported by several previous studies reporting higher growth rates in intensively reared goats and sheep, although a few contrasting reports suggest that local pasture quality may influence outcomes. Overall, the study establishes that intensive rearing is the most effective system for enhancing body weight and average daily gain in Berari goats, followed by semi-intensive and extensive systems, underscoring the importance of nutrient-rich and well-managed feeding strategies for improved productivity.

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Table 2: Average ± SE values of body weight (kg) of growing Berari goats

Groups	Weeks														
	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	XIII	XIV	Pooled Average ±SE
T0	11.87 ± 0.52	12.94 ± 0.53	13.92 ± 0.52	14.88 ± 0.53	15.8 ±0.52	16.69 ±0.52	17.55 ± 0.51	18.36 ± 0.50	19.14 ±0.49	19.85 ± 0.45	20.47 ± 0.40	21.01 ± 0.34	21.49 ± 0.29	22.08 ± 0.24	17.58 [a] ± 0.313
T1	11.87 ± 0.56	12.94 ± 0.58	13.85 ± 0.56	14.56 ± 0.54	15.34 ± 0.53	16.10 ± 0.53	16.79 ± 0.53	17.45 ±0.53	18.09 ± 0.53	18.67 ± 0.53	19.19 ± 0.52	19.66 ± 0.51	20.10 ± 0.50	20.50 ± 0.50	16.80 [a] ± 0.26
T2	11.69 ± 0.56	12.56 ±0.55	13.40 ± 0.55	14.18 ± 0.54	14.90 ± 0.54	15.56 ± 0.53	16.17 ± 0.52	16.73 ±0.50	17.21 ± 0.50	17.70 ± 0.49	18.06 ±0.48	18.35 ± 0.47	18.58 ±0.46	18.76 ± 0.45	15.99 [b] ± 0.22
Pooled Average ± SE	11.81 ± 0.02	12.81 ± 0.05	13.72 ± 0.06	14.54 ± 0.07	15.34 ± 0.09	16.11 ± 0.12	16.83 ± 0.14	17.51 ± 0.17	18.15 ± 0.20	18.74 ± 0.22	19.23 ± 0.25	19.67 ± 0.27	20.06 ± 0.30	20.44 ± 0.34	16.79 ± 0.04

abc = the mean bearing different alphabets as superscripts differ significantly

Table 3 : Average ± SE values of ADG of growing berari goats (gm)

Groups	Weeks													Pooled Average ±SE
	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	XIII	XIV	
T0	152.68 ± 5.87	139.73 ± 0.99	137.32 ± 2.25	130.98 ± 1.12	128.39 ± 4.01	121.96 ± 2.46	115.36 ± 3.57	112.32 ± 3.76	101.61 ± 5.23	87.68 ±9.53	77.32 ±9.28	69.11 ± 9.17	82.86 ±10.18	112.10 ±2.96 [a]
T1	152.32 ± 5.56	131.07 ± 4.98	100.18 ± 7.18	111.79 ± 3.06	108.21 ± 1.44	98.80 ± 2.27	94.64 ± 2.37	91.16 ± 2.23	83.84 ± 3.20	73.21 ±0.67	67.41 ±5.29	62.45 ± 5.42	57.50 ± 5.13	94.81 ± 2.72 [b]
T2	124.29 ± 0.71	120.27 ± 0.67	111.96 ± 1.40	102.59 ± 1.11	94.11 ± 1.91	87.43 ± 1.94	79.64 ± 2.76	69.29 ± 1.77	69.29 ± 1.77	50.98 ±2.09	42.29 ±2.31	33.21 ± 2.21	25.64 ± 2.97	77.77 ± 3.03 [c]
Pooled Average ± SE	143.10 ± 3.79	130.36 ± 2.33	116.49 ± 4.05	115.12 ± 2.70	110.24 ± 3.29	102.73 ± 3.24	96.55 ± 3.46	90.92 ± 3.96	84.91 ± 3.42	70.63 ±4.67	62.34 ±4.64	54.92 ± 4.75	55.33 ± 6.16	94.89 ± 1.82

abc = the mean bearing different alphabets as superscripts differ significantly

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Table 4: ANOVA for Body Weight and ADG

Source of variation	Body Weight		Body Weight Gain (ADG)	
	df	Ms	df	Ms
Treatments	2	70.619*/**	2	30649.1*/**
Error	333	9.316	309	925.204
Total	335		311	
Treatments were found significant at 1% and 5 % levels of significance.			Treatments were found significant at 1% and 5 % levels of significance.	
CD (0.01) = 1.051			CD (0.01) = 10.866	
CD (0.05) = 0.799			CD (0.05) = 8.267	

**,* = Treatment was found significant at 1% and 5 %, respectively.

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