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## Growth performance of Sirohi kids under stall feeding versus grazing system in the Vindhya region of Madhya Pradesh

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### Abstract

The present experiment was conducted on growth performance of Sirohi kids at Livestock Farm Complex (LFC), College of Veterinary Science & Animal Husbandry, Rewa (M.P.). Twenty four Sirohi kids of 3-4 months age of either sex with uniform body size and weight were selected. They were randomly divided into two groups (Group 01 and Group 02) of 12 animals in each. Deworming and vaccination carried out routinely as per schedule. Pre adoption period of 15 days was given to kids before starting experiment. The kids were selected for the experiment was free from physiological, anatomical and infectious diseases. Group 01 allowed to rear on complete stall feeding with supplementation of commercial concentrate feed while group 02 allowed was browsing around farm premises. Kids were allowed to feed 2% commercial readymade concentrate feed (20% protein and ME 2240 kcal/kg) on dry matter basis and 2% as greens (daily 6 hours grazing). Data of body weight (kg), body length (cm), height at withers (cm), heart girth (cm) was collected at monthly interval of experiment. Analysis of data of Sirohi kids revealed that average weight gain was significantly higher ( $p < 0.05$ ) in stall fed group as compared to grazing group. However, there was no significant difference in body length (cm), height at withers (cm), heart girth (cm) between stall fed group and grazing group. Thus present study revealed that stall feeding system positively affect the body weight but didn't affect the body morphometric parameters like body length (cm), height at withers (cm), heart girth (cm).

**Keywords:** Body weight, growth performance, grazing, heart girth, Sirohi kids, stall feeding

### 1. Introduction

Goat is a multi-use animal that plays an important part in the economy and nutrition of the country's landless small and marginal farmers because it can affectively survive on available shrubs and trees in harsh environmental conditions all over the world (Kabir *et al.*, 2004) [9]. According to the 20<sup>th</sup> livestock census, there are 535.78 million goats in India, making up 27.78% of the almost 102 goat breeds that exist worldwide. There are currently 861.9 million goats in the world (FAOSTAT, 2019) [6]. Among the Asian nations, India is second in the world for goat population. In India there are 148.88 million goats and in M.P., there are 11.06 million goats (BAHS, 2019) [1]. Rajasthan's most common breed of goat is Sirohi which makes about 60% of the state's whole goat population. They can be reared in central and southern Rajasthan, the majority of the aravali hills and other arid and semi arid regions (Waiz *et al.*, 2018) [17].

In India, goat farmers often raise their animals on community land without any further support (Girish *et al.*, 2012) [7]. Small ruminant are reared in three different systems like extensive (free range), semi-intensive and intensive (stall feed) (Yadav *et al.*, 2023) [15]. However in order to meet the demand for meat, the population of sheep and goats is increasing quickly to supply the demand for meat, it is causing grazing area to rapidly deteriorate and overcrowd the available grazing lands (Devi *et al.*, 2020) [5] because of the ongoing reduction in available common grazing resources, intensive and semi intensive goat husbandry will become more popular in the next years, while conventional extensive goat rearing will decline. In areas where grazing lands are shrinking, stall fed systems on a commercial scale may be a viable alternative method of raising small ruminants for meat (Kumar and pant, 2003) [10]. For marginal farmers as well as landless farmers, body weight is a good measure of both physical fitness and economic viability (Tadesse and Gebremariam, 2010) [16].

A variety of animal features are evaluated using morphological measurements in goats. These measurements offer crucial proof of the breeds development as well as the traits that alter in response to environmental and dietary influences. Additionally, body measurements are a crucial source of information for illustrating breed standards and providing details on the morphological makeup and production capacity of the animals. Hence, the present study was planned to study the growth performances of Sirohi kids under stall fed system versus grazing systems.

## 2. Materials and Methods

The present experiment was carried out at "Goat Unit" of Livestock Farm Complex (LFC), Department of Livestock Production Management, College of Veterinary Science & Animal Husbandry, Rewa (M.P.). A Twenty four (24) Sirohi goat kids of 3-4 months age of either sexes with similar body size and weight was selected. These goats were randomly divided into two different groups of 12 kids in each. Group (01) allowed to rear on complete stall feeding with supplementation of commercial concentrate ration. Group (02) allowed browsing around farm premises. Deworming and vaccination carried out routinely as per standard schedule. Pre adoption period of 15 days was given to all kids before starting experiment work. In this experiment commercial readymade concentrate feed were given (20% protein and ME 2240 kcal/kg) on dry matter basis. The goats were fed 4% of their body weight, out of which 2% as concentrate and 2% as greens and dry fodder. Kids were allowed (6 hours) for daily browsing. Data on body weight and body morphometric measurement (body length, height at withers, heart girth) of kids were recorded at monthly interval. The body weight of all the kids were recorded before feeding at monthly interval using digital electronic weighing balance. Body length was measured by using measuring tape and the distance was calculated from the anterior point of the shoulder to the posterior extremity of the pin bone of the goat kids. For height at wither a flat platform was used upon which the experimental animal was placed. The height at wither was measured as the distance from the surface of the platform to withers using a measuring tape. The heart girth was measured by taking the measurement of the circumference of the chest with a measuring tape at monthly interval.

The data obtained during the experiment were analysed for two way ANOVA using SPSS statistics software version 20 package as method depicted by Snedecor and Cochran (1994) [14].

## 3. Results and Discussion

The body weight (kg), body length (cm), height at withers (cm), heart girth (cm) are taken and are presented in table 01 and 02 respectively.

### 3.1 Body weight

The body weight (kg) of kids after one month of experiment in group 01 was 10.06±0.17 kg and in group 02 was 10.09±0.17 kg, respectively and the differences in the body weight of kids was non significant between group 01 and group 02. The mean value of body weight (kg) of kids in 2<sup>nd</sup> and 3<sup>rd</sup> month of experiment in group 01 was 11.89±0.18 kg and in group 02 was 11.13±0.37 kg respectively and the differences in the body weight of kids was non significant between the groups.

**Table 1:** Effect of grazing and stall feeding on Body weight (kg) in Sirohi kids

Month	Body Weight (kg)	
	Group-01	Group-02
1	10.06±0.17 <sup>A</sup>	10.09±0.17 <sup>A</sup>
2	11.89±0.18 <sup>AB</sup>	11.13±0.37 <sup>AB</sup>
3	12.93±0.74 <sup>ABC</sup>	12.07±0.53 <sup>BC</sup>
4	13.89±0.79 <sup>BCD</sup>	12.56±0.44 <sup>BC</sup>
5	15.06±0.79 <sup>CDE</sup>	13.15±0.45 <sup>CD</sup>
6	16.09±0.78 <sup>DE</sup>	13.07±0.48 <sup>CD</sup>
7	17.19±0.91 <sup>EF</sup>	13.55±0.45 <sup>CD</sup>
8	19.24±0.86 <sup>F<sup>Ga</sup></sup>	14.53±0.40 <sup>DEb</sup>
9	20.12±0.85 <sup>Ga</sup>	15.57±0.34 <sup>EFb</sup>
10	21.14±0.87 <sup>GHa</sup>	16.02±0.36 <sup>EFb</sup>
11	21.87±0.66 <sup>GHa</sup>	16.86±0.26 <sup>Fb</sup>
12	23.51±0.56 <sup>Ha</sup>	18.85±0.26 <sup>Gb</sup>

The mean value of body weight (kg) of kids in 4,5,6 and 7 months of experiment in group 01 was 13.89±0.79, 15.06±0.79, 16.09±0.78, 17.19±0.91 kg and in group 02 was 12.56±0.44, 13.15±0.45, 13.07±0.48, 13.55±0.45 kg respectively and the differences in the body weight (kg) of kids was non-significant between the groups. However, in 8, 9, 10, 11 and 12 months of experiment in group 01 was 19.24±0.86, 20.12±0.85, 21.14±0.87, 21.87±0.66, 23.51±0.56 kg and in group 02 was 14.53±0.40, 15.57±0.34, 16.02±0.36, 16.86±0.26, 18.85±0.26 kg respectively and the differences in the body weight (kg) of kids was show significant ( $P<0.05$ ) differences between groups.

The result obtained in the present findings are in agreement with Patil *et al.* (2014) [13] and Pathan *et al.* (2017) [12], who reported that the overall weight gain was significantly higher ( $p<0.05$ ) in stall fed group as compared to grazing group. Chopdar *et al.* (2022) [3] also reported that average body weight gain of Sirohi kids under intensive system and semi intensive system was significantly ( $p<0.01$ ) higher than extensive system. However, these results are contraindicated to the reports of Paramasivam *et al.* (2002) [11] and Jagadale (1981) [8], who concluded that goats maintained under semi-intensive system recorded significantly ( $p<0.01$ ) higher body weight and body weight gain/day followed by intensive system and extensive system. In the current study, this is most likely due to the stall fed group having sufficient feed and a more pleasant environment than the other group.

## 3.2 Body Morphometric Measurement

### 3.2.1 Body length

The mean value of body length (cm) of kids after one month of experiment in group 01 was 40.12±1.69 cm and in group 02 was 36.12±1.18 cm, respectively and the differences in the body length of kids was non significant between group 01 and group 02.

The mean value of body length (cm) of kids in 2,3,4,5,6,7,8,9,10,11 and 12 month of experiment in group 01 was 43.70 ±1.34, 45.62±1.35, 47.23±1.38, 47.70 ± 1.37, 48.25±1.14, 49.91±1.13, 49.95±0.84, 53.83±0.92, 56.30±0.95, 58.08±0.79, 60.80±0.96 cm respectively and in group 02 was 37.70±1.16, 39.59±1.24, 44.16±1.62, 46.62±1.82, 47.66±1.43, 47.79±0.90, 48.16±1.01, 51.95±0.85, 54.20±0.82, 56.04±0.68, 60.50 ±0.55 cm respectively and the differences in the body length (cm) of kids was non significant ( $P>0.05$ ) between the groups.

The results obtained in the present study are in agreement with Debbarma *et al.* (2022) [4] who reported that, there was no significant difference in body length (cm) between the different management systems of goat. However, the present findings are in disagreement with the observations made by *et*

*al.* (2022) [2] and Waiz *et al.* (2018) [17], who reported that the effect of sex, type of kidding, cluster and dam's weight at kidding significantly ( $p<0.01$ ) affect body length at birth, three, six, nine, and twelve months of age.

**Table 2:** Effect of grazing and stall feeding on Body length, Height at Weithers, Heart girth (cm) in Sirohi kids

Month	Body Length (cm)		Height at Weithers (cm)		Heart Girth (cm)	
	Group-01	Group-02	Group-01	Group-02	Group-01	Group-02
1	40.12±1.69 <sup>A</sup>	36.12±1.18 <sup>A</sup>	52.70±1.62 <sup>A</sup>	51.45±1.14 <sup>A</sup>	48.62±1.89 <sup>A</sup>	48.20± 0.80 <sup>A</sup>
2	43.7±1.34 <sup>AB</sup>	37.70±1.16 <sup>A</sup>	54.91±1.67 <sup>AB</sup>	52.83±0.69 <sup>AB</sup>	48.58±2.05 <sup>A</sup>	50.25±1.43 <sup>AB</sup>
3	45.62±1.35 <sup>BC</sup>	39.59±1.24 <sup>A</sup>	55.37±1.4 <sup>AB</sup>	53.87±0.64 <sup>AB</sup>	48.91±2.25 <sup>A</sup>	51.04±1.28 <sup>ABC</sup>
4	47.23±1.38 <sup>BC</sup>	44.16±1.62 <sup>B</sup>	58.95±1.67 <sup>ABCD</sup>	54.33±0.53 <sup>B</sup>	49.37±1.72 <sup>A</sup>	51.58±1.10 <sup>ABC</sup>
5	47.70±1.37 <sup>BC</sup>	46.62±1.82 <sup>B</sup>	57.58±1.31 <sup>ABC</sup>	55.58±0.60 <sup>BC</sup>	50.58±1.65 <sup>AB</sup>	52.20±0.86 <sup>ABCD</sup>
6	48.25±1.14 <sup>BC</sup>	47.66±1.43 <sup>BC</sup>	58.54±1.29 <sup>ABC</sup>	57.16±0.55 <sup>CD</sup>	52.25±1.60 <sup>ABC</sup>	52.29±0.94 <sup>ABCD</sup>
7	49.91±1.13 <sup>CD</sup>	47.79±0.90 <sup>BC</sup>	59.95±1.24 <sup>BCD</sup>	58.62±0.60 <sup>D</sup>	54.04±1.74 <sup>ABCD</sup>	53.70±0.96 <sup>BCD</sup>
8	49.95±0.84 <sup>CD</sup>	48.16±1.01 <sup>BC</sup>	63.33±1.49 <sup>CDE</sup>	61.45±0.66 <sup>E</sup>	56.17±1.91 <sup>ABCD</sup>	54.75±0.73 <sup>CDE</sup>
9	53.83±0.92 <sup>DE</sup>	51.95±0.85 <sup>CD</sup>	65.20±1.43 <sup>DEF</sup>	63.41±0.55 <sup>EF</sup>	58.25±1.91 <sup>BCDE</sup>	56.16±0.75 <sup>DE</sup>
10	56.30±0.95 <sup>EF</sup>	54.20±0.82 <sup>D</sup>	67.00±1.39 <sup>EF</sup>	64.95±0.54 <sup>FG</sup>	59.75±1.70 <sup>CDE</sup>	58.20±0.73 <sup>EF</sup>
11	58.08±0.79 <sup>EF</sup>	56.04±0.68 <sup>D</sup>	66.66±1.87 <sup>EF</sup>	66.08±0.54 <sup>G</sup>	61.70±1.53 <sup>DE</sup>	60.12±0.77 <sup>F</sup>
12	60.80±0.96 <sup>F</sup>	60.50±0.55 <sup>E</sup>	69.79±1.42 <sup>F</sup>	69.04±0.60 <sup>H</sup>	65.20± 1.14 <sup>E</sup>	63.79±0.62 <sup>G</sup>

### 3.2.2 Height at weithers

The mean value of height at weithers (cm) of kids after one month of experiment in group 01 was 52.70±1.62 cm and in group 02 was 51.45±1.14 cm, respectively and the differences in the height at weithers (cm) of kids was non significant between group 01 and group 02.

The mean value of height at weithers (cm) of kids in 2,3,4,5,6,7,8,9,10,11 and 12 month of experiment in group 01 was 52.70±1.62, 54.91±1.67, 55.37±1.4, 58.95±1.67, 57.58±1.31, 58.54±1.29, 59.95±1.24, 63.33±1.49, 65.20±1.43, 67.00±1.39, 66.66±1.87, 69.79±1.42 cm and in group 02 was 51.45±1.14, 52.83±0.69, 53.87±0.64, 54.33±0.53, 55.58±0.60, 57.16±0.55, 58.62±0.60, 61.45±0.66, 63.41±0.55, 64.95±0.54, 66.08±0.54, 69.04±0.60 cm, respectively and the differences in the height at weithers (cm) of kids was non significant between the groups.

The results obtained in the present study are in disagreement with Debbarma *et al.* (2022) [4] who reported the mean height at weithers (cm) of goats under extensive and intensive management systems were significantly ( $P<0.05$ ) higher than the goats reared under semi intensive management system. Similarly Waiz *et al.* (2018) [17] and *et al.* (2022) [2] who reported that effect of sex and cluster significantly ( $P<0.01$ ) affect the body measurement viz, height at weither at birth, three, six, nine and twelve months of age.

### 3.2.3 Heart girth

The mean value of heart girth (cm) of kids after one month of experiment in group 01 was 48.62±1.89 cm and in group 02 was 48.20± 0.80 cm, respectively and the differences in the heart girth of kids was non significant between group 01 and group 02.

The mean value of heart girth (cm) of kids in 2,3,4,5,6,7,8,9,10,11 and 12 month of experiment in group 01 was 48.58±2.05, 48.91± 2.25, 49.37±1.72, 50.58±1.65, 52.25±1.60, 54.04±1.74, 56.17± 1.91, 58.25± 1.91, 59.75±1.70, 61.70± 1.53, 65.20± 1.14 cm respectively and in group 02 was 50.25±1.43, 51.04±1.28, 51.58± 1.10, 52.20± 0.86, 52.29± 0.94, 53.70±0.96, 54.75± 0.73, 56.16±0.75, 58.20± 0.73, 60.12±0.77, 63.79±0.62 cm respectively and the differences in the heart girth (cm) of kids was non significant between the groups.

The results obtained in the present study are in disagreement

with Debbarma *et al.* (2022) [4] who reported the mean heart girth (cm) of goats were significantly greater ( $P<0.05$ ) only in extensive farming system as compared to intensive and semi intensive system. Similarly Waiz *et al.* (2018) [17] and *et al.* (2022) [2] who reported that effect of sex and cluster significantly ( $p<0.01$ ) affect the body measurement viz, heart girth at birth, three, six, nine and twelve months of age.

### 4. Conclusion

From the present experiment, it may be concluded that system of rearing *i.e.* grazing and stall feeding significantly increases the body weight but didn't affect the body morphometric parameters like body length (cm), height at weithers (cm), heart girth (cm). Hence, rearing of goats under stall feeding system may be preferred over grazing system by the farmers.

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