



Effect of Different Feeder Designs on the Development of Osmanabadi Goat Kids

**Gaurav Kankarwal ^a, Rupal Pathak ^{b*}, Vandana Bhagat ^a,
Nishma Singh ^a, Raina Doneria ^c, Mehtab S. Parmar ^d
and Kanti Kanwar ^a**

^a Department of Livestock Production Management, College of Veterinary Science and AH., Dau Shri Vasudev Chandrakar Kamdhenu Vishwavidyalaya, Anjora, Durg-491001, Chhattisgarh, India.

^b Department of Livestock Farm Complex, College of Veterinary Science and AH., Dau Shri Vasudev Chandrakar Kamdhenu Vishwavidyalaya, Anjora, Durg-491001, Chhattisgarh, India.

^c Department of Animal Nutrition, College of Veterinary Science and AH., Dau Shri Vasudev Chandrakar Kamdhenu Vishwavidyalaya, Anjora, Durg-491001, Chhattisgarh, India.

^d Department of Veterinary Physiology and Biochemistry, College of Veterinary Science and AH., Dau Shri Vasudev Chandrakar Kamdhenu Vishwavidyalaya, Anjora, Durg-491001, Chhattisgarh, India.

Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

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ABSTRACT

The effect of feeder design on the growth performance of the Osmanabadi goat kids was investigated at the Seed Centre for Osmanabadi Goats-DRS Farm, Dau Shri Vasudev Chandrakar Kamdhenu Vishwavidyalaya, Durg, (CG, India) for a period of 60 days during the winter season. A

*Corresponding author: Email: rupal.pathak3@gmail.com;

total of 18 Osmanabadi weaned kids were randomly divided into three groups with six kids (3 males and 3 females) in each group viz T1, T2 and T3. T1 group kids (control) were kept on conventional feeder, T2 on circular feeder and T3 on linear feeder. The maximum ($P>0.05$) mean body weight was observed on the 60th day in T3 (13.23 ± 0.33), as compared to T2 followed by T1. Similarly, a significantly higher mean body length was observed in T3 as compared to T1 and T2 groups on 45th and 60th day of the study. The maximum mean heart girth was observed on the 60th day in T3 (57.5 ± 0.67) followed by T2 (55.3 ± 1.4). Furthermore, the maximum mean height at wither was observed on the 60th day in T3 (58.1 ± 0.7) than T2 (57.1 ± 0.7) and T1 (55.8 ± 1.7). Our results revealed that modified linear feeder design positively influenced the growth performance of goat kids.

Keywords: *Osmanabadi goat kids; feeder design; growth performance; welfare.*

1. INTRODUCTION

Goat production is the leading component of the farming system and an important source of earnings for poor villagers [1]. India has second largest goat population (148.88 million) in the world [2]. Goat is acknowledged as “Poor Man’s Cow” as they aid in fulfilling household’s emergency financial requirements and best utilization of family labour [3]. Goats are mainly reared for meat production; however they also produce milk to meet the needs of the family. With very small investments goat rearing can be made in to a cost-effective venture for small and marginal farmers [4]. Since, the small ruminants are reared largely on common property resources, supplemented with top feeds and agricultural residues for meeting their feed and fodder necessities but these resources are diminishing gradually and steadily [5]. Subsequently, goat production system in India has been gradually moving from extensive to intensive system of management for commercial production [6]. Under urban and semi-urban settings, intensive system remains the sole alternative due to the paucity of space under which the goats are exclusively stall fed. Under either intensive or semi-intensive system, there shall be some arrangements for feeding of goats as per their browsing behavior [7].

Success of the goat farming is largely dependent on the environment where the goats are reared and its managerial aspect [8]. Raising of goats under intensive and semi-intensive system using superior technologies for marketable production has become vital not only for realizing their full potential but also to meet the rising demand of goat meat in the domestic as well as international markets [6]. Goats have diverse feeding behaviour; therefore it is essential to take into concern this behaviour while feeding of goats for profitable goat farming [9]. Design of

feeders have direct implications on performance of any farm with regard to feed intake, wastage of feed, aggression (injuries) and stress in group mates [10]. Ideal feeder guarantees the evenly dispersal of feed amongst animals with lesser aggression and waste of feed. Concurrently, feeding behaviour of animal must be fulfilled during feeding in such feeders. Monitoring of feeding activities in confinement and its probable impact on performance of animals is gaining importance [11]. Nevertheless, the studies on whether the feeders of different shapes have any impact on the growth performance of the growing goat kids are very scanty. Keeping in view above facts, the current investigation was aimed to gain an insight into the outcomes of using different feeder designs on growth performance of Osmanabadi growing kids.

2. MATERIALS AND METHODS

2.1 Experimental Animals and Design

The present investigation was carried out at the RKVY Osmanabadi Goat Seed Centre under Directorate Research Service, Dau Shri Vasudev Chandrakar Kamdhenu Vishwavidyalaya, Durg, (CG, India) for 60 days during the winter season. The study protocol was approved by Institutional Animal Ethical Committee, College of Veterinary Science and Animal Husbandry, DSVCKV, Durg, Chhattisgarh. Durg is situated at height of 317 meters above mean sea level at latitude and longitudes between 20° 23' and 22° 02' N & 80° 46' and 81° 58' E respectively. The weather of this place is dry tropical which is moderate but summer season is warm. In summer the highest temperature reaches up to 45°C in May – June whereas in winter temperature falls down up to 10°C. Eighteen Osmanabadi weaned kids of 5-6 month of age and weighing between 10-15 kgs, were selected for the trial. All the kids were randomly divided



Fig. 1. Different feeder designs: a) T2 Circular feeder b) T3 Linear feeder

Table 1. Dimensions of feeders and pen

Group	Type of Feeder	Dimension (cm)	Area of Pen (ft ²)
T1	Manger (conventional) (30 cm feeding space for each kid)	Total length: 188	10 x 10
T2	Modified circular (30 cm feeding space for each kid)	Circumference: 188 HxRxD: 95x31x12	10 x 10
T3	Modified linear (30 cm feeding space for each kid)	Total length: 188 HxWxD: 95x31x12	10 x 10

into 3 groups viz T1, T2 and T3 with 6 kids (3 males and 3 females) in each group. All the selected goat kids were dewormed with anthelmintic fenbendazole @ 7.5 mg/kg body weight before initiation of the experiment. The diet was formulated as per ICAR 2013 specifications. The animals were fed similar kind of green fodder *ad libitum* alongwith concentrate @ 150 g per day/animal at 8AM morning and 4PM evening. All the experimental animals were kept in clean sheds under hygienic conditions. Free access to clean water was given *ad libitum* to the kids under experiment.

2.2 Feeder Designs

All the animals of T1 group were kept on conventional feeder that served as control. Kids in T2 group were kept on modified circular feeder and similarly in T3 group animals were kept on modified linear feeder (Fig. 1). The details of feeder dimensions and area of pen is presented in Table 1.

The body weight of kids was recorded at weekly intervals by using electronic weighing balance. The morphometric measurements that is, heart girth, body length and height at wither were measured using measuring tape while animal at standing position. For heart girth, the circumference of the chest (in cm) around the

thoracic cavity behind the shoulder was measured. The body length of the animals was measured between point of shoulder and the pin bone. Height at wither was measured as the distance between point of toe (hoof) of fore limb to the highest point on wither.

2.3 Statistical Analysis

For interpretation of the results the data were analyzed by one way ANOVA and Chi- Square Analysis of Variance as per Snedecor and Cochran [12].

3. RESULTS AND DISCUSSION

3.1 Effect of Feeder Design on Body Weight (Kg)

The results of the effect of feeder on mean body weight of Osmanabadi goat kids are presented in Table 2. Overall, our results suggested a time-dependent increase in body weight with differential responses among treatment groups. We observed a steady but non-significant escalation in body weights across all the groups on 15, 30 and 45th day of experiment. Interestingly, a statistically significant ($P<0.05$) elevation in the T3 was registered on 60th day of study as compared to control group.

Table 2. Effect of feeder design on mean \pm S.E. of fortnightly body weight (kg) in Osmanabadi kids

Days of trial	T1 Conventional	T2 Circular	T3 Linear	P value
0 day	10.30 \pm 0.19	10.33 \pm 0.35	10.66 \pm 0.30	0.63
15 day	10.46 \pm 0.23	11.18 \pm 0.61	11.43 \pm 0.39	0.30
30 day	10.61 \pm 0.18	11.50 \pm 0.57	11.70 \pm 0.48	0.19
45 day	10.90 \pm 0.13	11.51 \pm 0.74	12.05 \pm 0.43	0.30
60 day	11.21 \pm 0.23 ^a	11.96 \pm 0.78 ^{ab}	13.23 \pm 0.33 ^b	0.04

Mean bearing different superscripts within a row differed significantly ** $P \leq 0.01$ /* $P \leq 0.05$

Table 3. Effect of feeder design on mean \pm S.E. of body length (cm) in Osmanabadi growing kids

Days of Trial	T1 Conventional	T2 Circular	T3 Linear	P Value
0 day	36.6 \pm 1.1	37.8 \pm 0.94	38.1 \pm 1.27	0.62
15 day	39.1 \pm 0.9	39.8 \pm 0.7	41.6 \pm 0.7	0.10
30 day	40.8 \pm 0.87	41.6 \pm 0.76	43.3 \pm 0.8	0.12
45 day	41.5 \pm 0.84 ^a	43.5 \pm 0.67 ^a	46.1 \pm 0.9 ^b	0.004
60 day	43.0 \pm 0.9 ^a	45.0 \pm 0.57 ^a	48.5 \pm 1.0 ^b	0.02

Mean bearing different superscripts within a row differed significantly ** $P \leq 0.01$ /* $P \leq 0.05$

The increasing trend of the body weight from 0 to 60th day of experiment in all the three groups may be attributed to the fact that the experiment was done in the growing kids and as the days progressed, growth was observed in all the kids under study. The similar increasing trend in body weight with age was observed in Osmanabadi growing kids by Rathod et al. [13]. Additionally, the value of overall mean of body weight in our study is also comparable with the findings of Rathod et al. [13] who recorded nearly similar overall body weight in Osmanabadi goat kids at 6 and 9 months of age (10.57 \pm 0.09 to 12.93 \pm 0.10). Though the difference between all the groups was non-significant from 0 to 45th day of experiment but the body weight of T3 group remained consistently higher than T2 and T1 respectively. On 60th day, the body weight of T3 group was significantly higher as compared to T2 and T1 which may be explained by the fact that, the kids of T3 group while feeding, were in comfortable and non-stressful condition. It may further be ascribed to the improved animal management system with modified linear feeder which reflected in the higher growth of kids in T3 group. The management system has a noteworthy influence on body growth and weight gain [14]. Our results are in general agreement with Kumari et al. [7], where the total body weight gain was found to be non-significantly higher in group III (modified linear) as compared to circular feeder, though there was also difference in the fodder size (unchopped vs chopped).

Similarly, Moniruzzaman et al. [15] reported significantly higher live weight gain of stall-fed black Bengal goats as compared to other systems of raising (tethering, restricted grazing and grazing group).

3.2 Effect of Feeder Design on Body Length (cm)

The results of effect of feeder on mean body length (cm) have been presented in Table 3. Over the experimental period, there was a steady increase in body length across all the groups with advancement in age of the animals. Furthermore, a statistically significant ($P < 0.05$) difference in body length was observed on 45th and 60th day in T3 as compared to T1 and T2 groups.

The fortnightly increasing trend in body length throughout the experimental period in all three groups may be elucidated by the fact that, as the age progressed the body length of the kids also increased as they were in the growing stage [13]. From 45th day till end of the experiment, the average body length of T3 group was significantly higher as compared to T2 and T1. In the present study, as the body weight was also higher in the T3 group, hence the body length also increased with the weight as both the traits are positively correlated with each other [16]. Our findings are in agreement with work of Iqbal et al. [17] who also found that there was a significant and high correlation between body weight and

body length, signifying that these two traits tend to move together. Additionally, Paramasivam et al [18] reported that body length of Barbari goats was significantly higher in intensive system compared to semi-intensive and extensive systems.

3.3 Effect of Feeder Design on Heart Girth (cm)

The result of effect of feeder on mean heart girth is presented in Table 4. Throughout the study, there was a general trend of increasing heart girth across all the groups. The maximum but non-significantly elevated heart girth was observed on the 60th day in T3 (57.5±0.67) followed by T2 (55.3±1.4) and control group (53.8±0.90). Besides, a non-significant difference in heart girth was registered across all groups from 0 to 60th day of experiment. Taken together, these findings suggested a time-dependent increase in heart girth with varied responses among treatment groups.

The increasing trend in fortnightly heart girth throughout the study period may be expounded by the fact that kids body measurements increased with progression of age. Our study showed non-significant higher heart girth in T3 group as compared to T2 followed by T1 group. As the body weight of T3 group was also higher, it had a positive impact on the heart girth too. In the similar line, Mule et al. [16] reported that there is highly positive correlation between mean body weight and mean body length, height at wither and chest girth, respectively. Contrary to our findings, Paramasivam et al. [18] reported a

significantly higher heart girth in semi-intensive system in Barbari goats. These differences may be credited to the dissimilarity in breed, different experimental settings and environmental conditions etc.

3.4 Effect of Feeder Design on Height at Wither (cm)

The results of effect of feeder on height of wither has been presented in Table 5. Throughout the study duration, there was a gradual but non-significant rise in height at wither across all the groups. Additionally, the maximum mean height at wither was observed on the 60th day in T3 group (58.1±0.7) followed by T2 (57.1±0.7) and T1 (55.8±1.7). Overall, these findings indicated a steady rise in height at wither with variations among treatment groups, with highest value registered in group T3.

All three groups exhibited an average escalation in the fortnightly height at wither during the study period of 0 to 60th days. Similarly, under different system, Paramasivam et al. [18] documented that body height of Barbari goats was significantly higher in intensive system compared to semi-intensive and extensive systems. Moreover, in another study Mule et al. [16] indicated a highly positive correlation between height at wither and chest girth. We observed the highest value in T3 group towards the end of the experimental period, which may further designate that this particular feeder design could provide a better and approachable feeding system that further paved the way for their improved growth performance.

Table 4. Effect of feeder design on mean ± S.E. of heart girth (cm) in Osmanabadi growing kids

Days of Trial	T1 Conventional	T2 Circular	T3 Linear	P value
0 day	47.0±2.3	47.5±2.4	49.1±2.2	0.79
15 day	49.0±1.4	50.6±1.8	52.8±1.6	0.29
30 day	50.1±1.0	51.8±1.7	54.3±1.0	0.12
45 day	52.0±0.9	53.3±1.4	56.0±0.8	0.06
60 day	53.8±0.9	55.3±1.4	57.5±0.67	0.07

Table 5. Effect of feeder design on mean ± S.E. of height at wither (cm) in Osmanabadi growing kids

Days of trial	T1 Conventional	T2 Circular	T3 Linear	P value
0 day	52.66±1.2	54.0±1.2	55.3±1.2	0.58
15 day	52.66±1.5	54.33±0.6	55.5±1.0	0.30
30 day	52.83±1.7	54.40±1.09	55.6±1.3	0.97
45 day	53.6±1.9	54.66±1.7	55.66±1.4	0.91
60 day	55.8±1.7	57.1±0.7	58.1±0.7	0.25

4. CONCLUSION

In conclusion, our study revealed that different feeder designs have a significant influence on the growth performance of the goat kids. Moreover, modified linear feeder design was more suitable as it led to better growth and welfare of goat kids.

DISCLAIMER (ARTIFICIAL INTELLIGENCE)

Authors hereby declare that NO generative AI technologies such as Large Language Models (ChatGPT, COPILOT, etc) and text-to-image generators have been used during writing or editing of manuscripts.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

REFERENCES

- Halpati J, Vahoniya DR. Scope of commercial goat farming in India. *J. Pharm. Innov.* 2022;11(6):2701-2706.
- BAHFS. Basic Animal Husbandry and Fisheries Statistics. Ministry of Agriculture, Department of Animal Husbandry, Dairying and Fisheries, Krishi Bhawan, New Delhi, India; 2019.
- Devi I, Shinde AK, Kumar A, Sahoo A. Stall feeding of sheep and goats: An alternative system to traditional grazing on community lands. *Indian J. Anim. Sci.* 2020;90(3):318–326.
Available:<https://doi.org/10.56093/ijans.v90i3.102317>
- Patil M, Kumar P, Teggeli RG, Ubhale P. A study on comparison of stallfeeding system of goat rearing with grazing system. *APCBEE Procedia.* 2014;8: 242-247.
DOI: 10.1016/j.apcbee.2014.03.034
- Shinde AK, Sejian V. Sheep husbandry under changing climate scenario in India: An overview. *Indian J. Anim. Sci.* 2013;83 (10): 998-1008.
- Kumar S. Commercial Goat Farming in India: An Emerging Agri-Business Opportunity *Agric. Econ. Res. Rev.* (Conference Issue). 2007;20: 503-520.
- Kumari A, Patel BHM, Maurya V, Godara AS, Verma MR, Singh M. Behavioral pattern of Rohilkhandi kids under different feeding systems. *Vet. World.* 2016;9(7): 773-776.
- Kumar BR, Pandian ASS. Growth performance of crossbred goat kids under different rearing systems. *Indian J. Anim. Sci.* 2020;90 (12):1663–1665.
DOI:10.56093/ijans.v90i12.113207
- Patil PV, Patil MK. Feeding Behaviour of Goats and Factors Affecting Nutrient and Feed Intake in Goats. *Just Agriculture.* 2021;2(3):1-4.
- Kaur G, Kaswan S, Singh C, Singla M, Sharma A, Dash SK, Lamba JS. Does Feeder Type Influence the Performance of Stable and Mixed Bucks in Stall Fed System? *Iran. J. Appl. Anim.* 2023;13(3): 485494. 20.1001.1.2251628.2023.13.3.9.9
- Kaur G, Kaswan S, Singla M, Sharma A, Lamba JS. Behaviour of Beetal does and bucks at linear vs. hexagonal feeder with special reference to homologous regrouping. *Appl. Anim. Behav. Sci.* 2021; 234:1-11.
DOI:10.1016/j.applanim.2020.105210
- Snedecor GW, Cochran WG. Statistical Methods. 8th edn., Iowa State University Press, Ames, Iowa, USA; 1994.
- Rathod SP, Deokar DK, Deshmukh AR, Lokhande AT, Birari DR, Jadhav SS. Studies on post weaning body weight and body measurement in Osmanabadi goats. *Indian Journal of Fundamental and Applied Life Sciences.* 2011;1(4):281-285.
- Patel AK, Rohilla PP, Mathur AC. Performance of Marwari kids and goats under improved and traditional animal shelter. *Indian Vet. J.* 2007;84(10):1069-1071.
- Moniruzzaman M, Hashem MA, Akhter S, Hossain MM. Effect of feeding systems on feed intake, eating behavior, growth, reproductive performance and parasitic infestation of Black Bengal goat. *Asian-Aust. J. Anim. Sci.* 2002;15(10):1453-1457.
DOI: 10.5713/ajas.2002.1453
- Mule MR, Barbind RP, Korake RL. Relationship of body weight with linear body measurement in Osmanabadi goats. *Indian J. Anim. Res.* 2014;48 (2):155-158.

- DOI: 10.5958/j.0976-0555.48.2.033
17. Iqbal M, Javed K, Ahmad N. Prediction of body weight through body measurements in Beetal goats. J. Anim. Plant Sci. 2013; 65(4):458-461.
 18. Paramasivam A, Arunachalam S, Sivakumar T, Ramesh V. Growth performance and carcass traits of Barbari goats under different system of management. Indian J. Anim. Sci. 2002;72 (11):1016-1018.

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