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Effect of Flooring Material on Body Weight and Biometry of Growing Deccani Lambs

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Abstract

A study was carried to assess the effect of different flooring material on the body weight and biometry of the growing Deccani lambs in intensive farming system. Eighteen growing lambs of either sex with uniform body weight of 12.61±0.04 kg and aged between 3 to 6 months were assigned randomly to three flooring types viz., Mud floor (control, T1), Concrete floor (T2) and mud floor with rubber mats (black, rubber material, 8 mm thick (T3). The study was conducted from April 2019 to June 2019. No significant (P>0.05) difference was observed for the fortnightly body weights and total weight gain of the lambs among three treatment groups. The average daily gain was comparable among the treatment groups. The overall fortnightly biometric measurements like body length, chest girth, the height at withers and hip width of growing Deccani lambs increased linearly throughout the experimental period and showed non-significant (P>0.05) difference among the groups. It is concluded that among the flooring materials, rubber mats relatively improved the body weight and biometry of the Deccani lambs.

Keywords: Body Weight, Biometry, Deccani Lambs and Flooring Materials

Introduction

As per the 20th Livestock Census (2019), the sheep population in India is 74.26 million and contributes 13.87 % of the total livestock population. India ranks third in the world sheep population with 6.8% of the world population and contributing to 4.9% of total meat production in the country. Telangana state is known for its diversified livestock resources. It ranked first in the sheep population with 19.1 million and contributing 25.72% of the total sheep population in India (D.A.H., GOI, 2019). Small ruminant farming is the livelihood of nearly 5.32 lakh families in the state. Telangana is the home tract of the Deccani breed of sheep which is well-known for its hardiness and well adopted to critical climatic conditions even in inadequate water and fodder availability (Vani *et al.,* 2017).

Sheep are usually kept under extensive management and reared on natural vegetation but due to shrinkage of grazing land, the maintenance of flocks under the extensive system is threatened. However, semi-intensive and intensive systems of sheep rearing with small flocks are gaining momentum. Housing plays a key role in lamb management. Lambs are precious assets to the shepherds and the post weaning growth rate mainly depends upon the proper housing management. An ideal housing enables in moderating the range of microclimate to which the animals are exposed and the wellbeing varies upon the forms of housing and floor in which they are kept. Therefore, the present study was carried out to assess the body weight and biometry of growing Deccani lambs on the different flooring materials.

Material and Methods

The experiment was conducted out in Sheep and Goat unit of Livestock Farm Complex, College of Veterinary Science, Hyderabad. Hyderabad city lies at 17.366° N latitude and 78.476° E longitude in the Deccan Plateau and rises to an average height of 536 m above the sea level. The climate of the Hyderabad is unique which has a combination of a tropical wet and dry climate that borders on a hot semi-arid climate.

Eighteen growing lambs of either sex with uniform body weight of 12.61±0.04 kg and aged between 3 to 6 months were selected from Sheep and Goat unit of LFC and randomly allotted to three flooring types viz., Mud floor (control, T1), Concrete floor (T2) and mud floor with rubber mats (black, rubber material, 8 mm thick (T3). All the lambs in the experiment were housed under conventional housing provided with a floor space of $1m^2$ / lamb in the covered shed with an asbestos roof. All the animals in three groups were fed with concentrate mixture as per the ICAR (2013) plus ad-libitum green fodder (para grass) twice in a day, 8 AM and 3 PM. The study was conducted from April to June 2019 (90 days). All animals were dewormed with Albendazole @ 10 mg /kg body weight before start of the experiment and allowed a seven days acclimatization on the same flooring materials before start of the experiment.

Body measurements indicate the skeletal growth of the animals. Body length and height at withers are the measures of bone growth while chest girth is measure of development of muscles, bones and fat (Ramod *et al.,* 2018). Body weight of lambs were recorded at fortnightly intervals using a digital electronic weighing balance before offering feed and water in the morning. Total weight gain was calculated by subtracting the final body weight from initial body weight and average daily gain was calculated by dividing the weight gain by number days of the experiment. Biometric measurements like body length, chest girth, height at withers and hip-width were recorded as per Rajanna *et al.* (2013) with the help of a standard measuring tape to the nearest 0.5 centimetre after the animals were allowed to stand squarely on an even ground. Body length (cm) is measured from point of shoulder to the point of tuber ischia of the same side; Chest girth (cm) is measured as distance of body circumference around the chest, ventrally behind the elbow joint; Height at weightier (cm) measured from the base of the hoof to the highest point of withers and hip width (cm) is the distance from the tuberosity prominence of ilium bone of one side to the other, across the rump. The data were subjected to analysis of variance (Snedecor and Cochran, 1994) and comparison of means of different treatment groups was made by Duncan's multiple range test (Duncan, 1955) using SPSS statistical software (version 25.0; SPSS, 2019).

Results and Discussion

Body Weight of Lambs on Different Flooring Material

Effect of flooring materials on fortnightly recorded body weight, weight gain and ADG is presented in Table 1. The

overall mean for body weight (kg) of Deccani lambs was 16.09±0.97, 15.90±0.94 and 16.24±0.98 on T1, T2 and T3 groups, respectively. The initial body weights (kg) of lambs was 12.65±1.47, 12.57±1.48 and 12.59±0.92 and which was increased to 19.43±2.09, 19.25±2.43 and 19.55±1.87 kg, respectively in T1, T2 and T3 by sixth fortnight. The body weight of lambs increased as they are in growing stage. Statistical analysis of the data showed insignificant difference among three treatment groups. The total gain in body weight (kg) was 6.78±0.73, 6.68±1.40 and 6.96±0.95 in T1, T2 and T3 groups, respectively. The total weight gain was higher in lambs reared on rubber mat by 4.2% than lambs reared on concrete floor. This could be due to that the rubber mat floor provided the maximum comfort to lambs and more time to lie down on the floor compared to the concrete floor. An increased resting time may result in better quality sleep that leads to an altered growth hormone secretion and improved growth.

Table 1: Effect of flooring materials on fortnightly recorded body weight (kg), weight gain and ADG (g)

Period	T1	T2	T3	SEM	P Value
Overall mean	16.09±0.97	15.90±0.94	16.24±0.98	0.525	0.968
Initial	12.65 ± 1.47	12.57 ±1.48	12.59 ± 0.92	0.716	0.999
Fortnight 1	12.98 ± 1.46	12.97 ± 1.53	13.22 ± 1.03	0.737	0.989
Fortnight 2	14.18 ± 1.79	14.02 ± 1.78	14.22 ± 1.27	0.886	0.996
Fortnight 3	15.32 ±1.89	15.18 ± 2.06	15.47 ± 1.44	0.986	0.994
Fortnight 4	16.85 ± 2.03	16.47 ± 2.21	16.92 ± 1.68	1.08	0.985
Fortnight 5	17.80 ± 2.05	17.50 ± 2.30	18.10 ± 1.84	1.126	0.979
Final fortnight (6)	19.43 ± 2.09	19.25 ± 2.43	19.55 ± 1.87	1.163	0.995
Total weight gain (kg)	6.78±0.73	6.68±1.40	6.96±0.95	0.578	0.982
ADG (g)	75.33±12.69	74.22±11.96	77.33±8.48	6.08	0.98

The results of the present study are in concurrence with the findings of Jaborek *et al.* (2016), Chikwanda and Muchenje (2017), Archana (2018), Modi *et al.* (2019) and Mohit *et al.* (2019) who reported that there was no significant difference in the body weight and total weight gain due to different flooring types in different species. However, Divate (2014) and Deshmukh (2017) reported that the body weight was significant among the different flooring systems which was thus contradictory to the present findings. In contrast to the present findings, Yanar *et al.* (2010) and Kartal and Yanar (2011) reported a significant weight gain in calves maintained on rubber mats. The average daily gain (ADG) of Deccani lambs was 75.33±12.69, 74.22±11.96 and 77.33±8.48 g in T1, T2 and T3 groups, respectively. The recorded ADG was comparable among the three treatment groups. Similar findings were observed by Mohith *et al.* (2019) in Barbari kids maintained on Plastic slats, soil and on the rubber mat bedding material.

The present findings were not in agreement with Sundaram *et al.* (2002) and Yasotha and Sivakumar (2013) who reported that there was a significant difference ($P<0.05$) in ADG among the different floors.

Biometry on Different Flooring Material

Body Length

The overall mean of body length of lambs reared on T1, T2 and T3 groups was 48.42±0.83, 48.14±0.87 and 48.90±1.03 cm, respectively. The initial body length was 44.92±1.08, 44.67±2.29 and 44.33±1.31 cm in mud, concrete and rubber mat floors, respectively and was increased to 51.50 ±2.24, 50.92±1.89 and 52.42±1.87 cm in sixth fortnight in mud, concrete and rubber mat floors, respectively. Body length of growing Deccani lambs has increased linearly throughout the experiment period and statistical analysis revealed a non-significant difference among three treatment groups (Table 2). Rubber mat floor was comfortable to exhibit physiological functions of lambs and stretching of their body parts, like head, neck and legs while resting, standing and lying time. Similar findings were recorded by Archana (2018) who observed the body length was relatively higher on rubber mats followed by straw bedded and concrete floor. These results were also supported by the results of Monali Bhaskar (2018) and Mohit *et al.* (2019) who found that the fortnightly body length of kids was non-significant among the different flooring material.

Table 2: Effect of flooring materials on body length (cm) in Deccani lambs

Period	T1	T2	T3	SEM	P Value
Initial	44.92 ± 1.08	44.67 ± 2.29	44.33 ± 1.31	0.895	0.969
Fortnight 1	46.00 ± 1.15	45.42 ± 2.14	45.50 ± 1.62	0.918	0.966
Fortnight 2	46.67 ± 1.35	46.50 ± 2.19	47.00 ± 1.72	0.971	0.98
Fortnight 3	47.92 ± 1.42	47.08 ± 2.09	48.33 ± 1.89	0.998	0.887
Fortnight 4	48.58 ± 1.57	48.67 ± 2.10	49.58 ± 1.91	1.02	0.916
Fortnight 5	50.17± 1.80	49.83 ± 2.01	50.67 ± 1.96	1.05	0.954
Final fortnight (6)	51.50 ± 2.24	50.92 ± 1.89	52.42 ± 1.87	1.1	0.869
Over all mean	48.42±0.83	48.14±0.87	48.90±1.03	0.503	0.839

Chest Girth

The circumference of chest girth of the animals is an important indicator of animal health, body weight and size and which helps in respiration. The overall mean of chest girth was 64.95±1.28, 64.64±1.27 and 65.00±1.40 cm in mud, concrete and rubber mat floors, respectively. The initial mean chest girth was 60.83±2.61, 60.50±1.52 and 61.00±3.12 cm in T1, T2 and T3 groups, respectively and was increased to 70.08±2.55, 69.92±2.73 and 71.00± 3.91 cm in sixth fortnight in T1, T2 and T3 groups, respectively. The chest girth was similar among the treatment groups. The observed overall mean for chest girth (cm) was numerically higher in the T1 and T2 groups (Table 3). This could be due to more weight gain along with bony growth in the lambs reared on T1 and T2 groups compared to the T3 group. These results are supported by the results of Monali Bhaskar (2018) and Mohit *et al.* (2019) who found that the fortnightly comparison of chest girth of kids was non-significant among the different flooring material.

Table 3: Effect of flooring materials on chest girth (cm) in Deccani lambs

Period	T1	T2	T3	SEM	P Value
Initial	60.83 ± 2.61	60.50 ± 1.52	61.00 ± 3.12	1.361	0.99
Fortnight 1	61.33 ± 2.65	60.83 ± 1.51	61.08 ± 3.07	1.358	0.99
Fortnight 2	62.67 ± 2.68	61.83 ± 2.26	62.75 ± 3.26	1.498	0.999
Fortnight 3	63.67 ± 2.84	63.58 ± 2.21	63.92 ± 3.03	1.472	0.996
Fortnight 4	65.42 ± 2.57	64.78 ± 2.06	65.08 ± 3.22	1.443	0.986
Fortnight 5	66.58 ± 2.83	65.92 ± 2.28	66.17 ± 3.17	1.512	0.986
Final fortnight (6)	70.08 ± 2.55	69.92 ± 2.73	71.00 ± 3.91	1.699	0.966
Over all mean	64.95±1.28	64.64±1.27	65.00±1.40	0.716	0.979

Height at Withers

The overall mean of height at withers (HAW) was 56.26±1.25, 55.82±1.13 and 57.99±1.16 cm in T1, T2 and T3 groups, respectively. No significant difference (P>0.05) was observed in height at withers among the lambs reared in three different floors. The findings indicated that the mean fortnightly height at withers of growing Deccani lambs increased linearly throughout the experiment period. HAW was numerically higher in Deccani lambs maintained on rubber mat floor and lower in mud and concrete flooring (Table 4). This could be due to more weight gain along with bony growth in the lambs reared on rubber mat floor and it reflects the rubber mat floor was comfortable. Similar results were reported by Monali Bhaskar (2018) and Mohit *et al.* (2019) kids.

Hip Width

The overall mean of hip width was 20.63±0.75, 20.16±1.11 and 21.14±0.84 cm in T1, T2 and T3 groups, respectively. The initial hip width was 16.00±0.86, 14.67±0.42 and 15.67± 0.56 cm T1, T2 and T3 groups, respectively and was increased to 23.25 ± 0.75, 23.17 ± 1.01 and 23.08 ± 1.23 cm in sixth fortnight in T1, T2 and T3 groups, respectively. The findings indicated that the mean fortnight hip width of growing Deccani lambs

increased linearly throughout the experimental period. The floor type did not have any significant (P>0.05) effect on hip width (cm) in lambs reared on different floors. The results obtained in the present study are non-comparable as the literature on hip width (HW) of Deccani lambs on different flooring systems was scanty.

Table 4: Effect of flooring materials on height at withers (cm) in Deccani lambs

Period	T1	T2	T3	SEM	P Value
Initial	51.00 ± 0.82	51.17 ± 1.58	51.92 ± 0.99	0.644	0.843
Fortnight 1	52.50 ± 0.85	53.00 ± 1.50	53.83 ± 1.01	0.641	0.718
Fortnight 2	54.08 ± 1.17	53.67 ± 1.62	56.08 ± 1.37	0.802	0.447
Fortnight 3	55.08 ± 1.13	54.67 ± 1.72	57.33 ± 1.47	0.844	0.406
Fortnight 4	57.00 ± 1.24	56.08 ± 2.00	58.75 ± 1.58	0.927	0.519
Fortnight 5	57.75 ± 1.41	56.83 ± 1.84	60.25 ± 1.59	0.948	0.333
Final fortnight (6)	61.17 ± 1.14	60.67 ± 1.98	61.67 ± 1.69	0.893	0.912
Over all mean	56.26±1.25	55.82±1.13	57.99±1.16	0.681	0.415

Table 5: Effect of flooring materials on hip width (cm) in Deccani lambs

Period	T1	T2	T3	SEM	P Value
Initial	16.00 ± 0.86	14.67 ± 0.42	15.67 ± 0.56	0.372	0.334
Fortnight 1	18.00 ± 1.06	15.83 ± 0.60	17.33 ± 0.80	0.508	0.211
Fortnight 2	19.50 ± 0.98	18.08 ± 0.66	20.08 ± 1.13	0.552	0.333
Fortnight 3	20.25 ± 0.93	20.83 ± 0.76	21.00 ± 1.35	0.57	0.868
Fortnight 4	20.83 ± 0.84	21.00 ± 0.83	22.08 ± 1.29	0.565	0.646
Fortnight 5	21.92 ± 0.62	22.08 ± 0.93	22.58 ± 1.16	0.511	0.872
Final fortnight (6)	23.25 ± 0.75	23.17 ± 1.01	23.08 ± 1.23	0.551	0.993
Over all mean	20.63±0.75	20.16±1.11	21.14±0.84	0.505	0.787

Conclusion

The body weight, total weight gain, ADG and biometric measurements were similar among the different flooring materials. However, the overall performance of the Deccani lambs was relatively superior on the rubber mat floors compared to the other floors. Further studies are required for more insights of flooring materials.

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Conflict of Interests

There is no conflict of interest.

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