EFFECT OF DIFFERENT FLOOR TYPES ON BODY CONDITION SCORE, DIRT SCORE, EGGS PER GRAM OF FAECES AND HOOF CONDITION IN STALL FED NELLORE BROWN RAM LAMBS

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ABSTRACT

Twenty four Nellore brown ram lambs (15.32 ± 0.39 kg body weight) of 3-6 months aged were used to assess the effect of different floor types on body condition score (BCS), dirt score, eggs per gram (EPG) count of faeces and hoof condition under intensive rearing system for a period of 120 days. Lambs were assigned randomly to one of three treatments. Treatment groups were mud/gravel floor-control (T1; n = 8), concrete floor (T2; n = 8) and elevated plastic slatted floor (T3; n = 8). Significantly higher BCS observed in experimental groups in first (P<0.01) and eighth (P<0.05) fortnights, whereas the difference observed in other fortnights was not-significant. Significant (P<0.05) difference in dirt score was observed among three floor types and lowest dirt score was observed in lambs kept in T3 group. Higher dirt score indicated that the lambs reared on concrete floor were dirtier than lambs on mud floor whereas, lambs reared on elevated plastic slatted floor (low score) were cleaner than other two groups. There was a significant difference in EPG count of faeces among treatment groups. The EPG count of T3 group was significantly (P<0.05) lower from second to fourth month and T2 group also recorded lower EPG value in third month of the experiment indicating lesser incidences of parasitic infestation. The study also revealed significant (P<0.05) difference in hoof length among three treatment groups. Higher hoof length (cm) was recorded in T3 group throughout the experiment except the first fortnight. It is concluded that, elevated plastic slatted floor is recommended for rearing of ram lambs for higher BCS, cleanliness (dirt) score and lower EPG count of faeces together with a periodical hoof trimming for early marketability of healthy ram lambs.

Key words: Body condition score, Dirt score, Eggs per gram, Hoof condition, Nellore ram lambs

Received : 26.10.2022 Revised : 09.12.2022 Accepted : 23.12.2022

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INTRODUCTION

World's most of the developing countries are found in the tropics, which are currently experiencing a rapid increase in human population, dramatic urbanization, monetarization of economics and income change. Thus, the major problems to be addressed for these developing countries include enhancement of food security by combating poverty and achieving agricultural growth that would contribute to overall economic development. Sheep with its multi-facet utility (for meat, wool, manure etc.) is playing an important role in the Indian agrarian economy. As per the 20th livestock census held in 2019, the sheep population in India is 74.26 million, contributing to 13.83 per cent of total livestock population showing that the sheep population has increased by 14.13% over previous livestock census held in 2012. The 20th livestock census also revealed that, the Telangana state ranked first in sheep population with 19.1 million and contributing 25.72 % of the total sheep population in India (Anonymous, 2019). Nellore breed of sheep is one of the most popular mutton breeds in the country and as per breed survey 2013, the population of Nellore breed is about 1,17,45,867 and accounts for 19 % of the total sheep in our country.

As far as animal health, growth and welfare are concerned type of the floor plays an important role in animal housing and management (Rajanna *et al.*, 2013) and they also revealed that the animal behaviour, health and growth performance may get affected depending upon the type of flooring provided, if the flooring material causes stress to the animal. The floor type plays a key role in lamb management and an ideal housing enables in moderating the range of microclimate to which the animals are exposed and the degree of comfort depends upon the types of housing and type of floor and in which, type of the floor is a significant issue in animal welfare (Stefanowska *et al.,* 2002). Keeping in view on the importance of floor type, the present study is aimed to study the effect of different floor types on body condition score (BCS), dirt score, eggs per gram (EPG) count of faeces and hoof condition under intensive rearing system.

MATERIALS AND METHODS

The present study was undertaken at sheep unit of Livestock Farm Complex, College of Veterinary Science, Rajendranagar, Hyderabad in Telangana state following the bioethics protocols in animal experimentation. The study area was classified as Deccan plateau in southern part of India, at 17.366° N latitude and 78.476° E longitude and elevation of 536 m above sea level. The study area has a unique combination of a tropical wet and dry climate that borders on a hot semi-arid climate (Koppen climate classification) and during the study period, the average maximum temperature recorded was 35.5˚C, while average minimum temperature was 25.6˚C.

Twenty-four Nellore brown ram lambs with average body weight of 15.32 ± 0.39 kg and aged 3-6 months, procured from

Livestock Research Station (LRS), Mamnoor, Warangal were used for the present study. The lambs were then allotted randomly to 3 treatment groups (eight lambs in each group) i.e., conventional mud (gravel) floor (control, T1), concrete floor (T2) and elevated plastic slatted floor (T3) in a completely randomized design and kept under intensive system of management. All the experimental animal groups were kept separately under hygienic conditions in well ventilated pens (1 m^2 per animal) and were not allowed for grazing. Deworming was done to all animals at the beginning of the experiment and once again in the middle of the experiment *i.e.,* after 60 days. Healthy surroundings and proper cleanliness were maintained in the experimental sheds. All three groups of ram lambs were offered concentrate mixture as being fed to other stock in the farm along with *adlibitum* green fodder (Para grass) and maize silage twice in a day i.e., 8.00 AM and 3.00 PM, meeting the nutrient requirements as suggested (ICAR, 2013). All the lambs were allowed to acclimatize to their respective flooring for 7 days and then, the study was carried out for a period of 120 days (March to July 2021).

Body condition scoring was done on a five-point scale with intermediate 0.5 units (Russel, 1969). The body condition score was given as 1,2,3,4 and 5 to emaciated, thin, average, fat and obese conditions, respectively.

An evaluation of cleanliness (dirt scoring) was performed fortnightly during the experimental period. The animal's body was divided into three areas (side, back and legs) and each area was given a score from 0 to 3 (Hansen *et al.*, 2012).

The score was given as 0 for clean, 2 for < 25% dirt and 3 for > 25% dirt for side and back areas. Whereas 0 for clean < 25% dirt for upto the hock/ elbow and > 25% for dirt upto the belly legs.

Faecal samples were collected directly from the rectum of the lambs and put into faecal collection bags at monthly intervals and analyzed for the presence of eggs by using "Mc Masters egg counting technique" and infection levels were determined based on the number of eggs per gram and interpreted (Blessy *et al.*, 2017).

The egg per gram of faeces was determinated by light infection (< 1000 epg), moderate infection (1000 – 2000 epg) and serious infection (> 2000 epg).

The hoof condition of the lambs of three experimental groups were visually examined for any lesions, erosions, deformities and overgrowth (hoof length) every fortnightly as suggested (Tharuntej *et al.,* 2020). Lambs with symptoms of any injury or lesions were treated immediately. The hoof length was measured with the help of measuring tape and expressed in centimeters (cm).

RESULTS AND DISCUSSION

The body condition score of lambs reared on different floor types is presented in Table 1. The initial BCS of Nellore ram lambs was 1.66 ± 0.04, 1.67 ± 0.05 and 1.67 ± 0.04 and the final BCS was 2.36 ± 0.13,

2.58 ± 0.18 and 3.00 ± 0.16 in T1, T2 and T3 groups, respectively. Significantly higher BCS observed in experimental groups in first (P<0.01) and eighth (P<0.05) fortnights, whereas the difference observed in other fortnights was not-significant. This could be due to the increased body weight of lambs maintained on elevated plastic slatted floors, which reflected increased body fat reserves, muscle thickness and the BCS. The present findings are in agreement with the reports of Tharuntej *et al.* (2020) who recorded significant effect of different floors on BCS. The present findings are not in agreement with the findings of Chikwanda and Muchenje (2017), who observed a non-significant effect of floor type on body condition score.

Table 1. Body condition score of Nellore ram lambs under different floor types

Floor Type	Initial BCS	Fortnightly Body Condition Score[#] (Mean ± SE)							
		1[**]	2	3	4	5	6	7	8[*] (Final BCS)
T1 (Conventional Mud Floor: Control)	1.66 ± 0.04	1.79 ± 0.05[a]	1.80 ± 0.10	1.80 ± 0.13	2.00 ± 0.14	2.02 ± 0.15	2.14 ± 0.15	2.29 ± 0.16	2.36 ± 0.13[a]
T2 (Concrete Floor)	1.67 ± 0.05	1.92± 0.04[ab]	2.04 ± 0.10	1.92 ± 0.08	2.13 ± 0.14	2.28 ± 0.19	2.45 ± 0.19	2.52 ± 0.21	2.58 ± 0.18[ab]
T3 (Elevated Plastic Slatted Floor)	1.67 ± 0.04	2.01 ± 0.06[b]	2.03 ± 0.10	1.96 ± 0.14	2.30 ± 0.18	2.38 ± 0.20	2.60 ± 0.19	2.72 ± 0.18	3.00 ± 0.16[b]
n	08	08	08	08	08	08	08	08	08
SEM	0.024	0.034	0.059	0.065	0.088	0.107	0.109	0.109	0.105
P value	0.988	0.018	0.194	0.631	0.429	0.408	0.237	0.301	0.034

[ab]Means with different superscripts column wise differ significantly [*](P<0.05), [**](P<0.01)

[#]Each value is an average of eight observations; n = No. of animals in each treatment;

P = Probability Value; SEM: Standard Error Mean

The dirt score of Nellore ram lambs reared on three different floor types is presented in Table 2. The observed dirt score values at the beginning of the experiment were 0.52 ± 0.22, 0.87 ± 0.21 and 0.12 ± 0.06 and at the end were 0.71 ± 0.26, 0.75 ± 0.20 and 0.17 ± 0.06, on mud, concrete and elevated plastic slatted floors, respectively.

Table 2. Dirt score of Nellore ram lambs under different floor types

Floor Type	Initial Dirt Score**	Fortnightly Dirt Score# (Mean ± SE)							
		1*	2**	3**	4	5*	6**	7	8* (Final Dirt Score)
T1 (Conventional Mud Floor: Control)	0.52 ± 0.22^{ab}	0.66 ± 0.19^{b}	0.71 ± 0.22^{b}	0.62 ± 0.17^{b}	0.62 ± 0.18^{b}	0.76 ± 0.21^{b}	0.62 ± 0.21^{b}	0.71 ± 0.26^{b}	2.36 ± 0.13^{a}
T2 (Concrete Floor)	0.87 ± 0.21^{b}	0.79 ± 0.20^{b}	1.08 ± 0.22^{c}	1.04 ± 0.18^{c}	0.71 ± 0.25^{b}	0.70 ± 0.21^{b}	0.91 ± 0.22^{b}	0.75 ± 0.20^{b}	2.58 ± 0.18^{ab}
T3 (elevated Plastic Slatted Floor)	0.12 ± 0.06^{a}	0.17 ± 0.09^{a}	0.17 ± 0.09^{a}	0.17 ± 0.09^{a}	0.12 ± 0.06^{a}	0.17 ± 0.09^{a}	0.12 ± 0.06^{a}	0.17 ± 0.06^{a}	3.00 ± 0.16^{b}
N	08	08	08	08	08	08	08	08	08
SEM	0.116	0.108	0.131	0.114	0.114	0.114	0.121	0.118	0.105
P value	0.019	0.032	0.008	0.002	0.069	0.053	0.016	0.067	0.034

^{abc}Means with different superscripts column wise differ significantly *(P<0.05), **(P<0.01)

$^{\#}$Each value is an average of eight observations; n = No. of animals in each treatment;

P = Probability Value; SEM: Standard Error Mean

Table 3. EPG Count of Nellore ram lambs under different floor types

Floor Type	Monthly EPG Count[#] (Mean ± SE)			
	1st	2nd**	3rd**	4th**
T1(Conventional Mud Floor: Control)	114.29 ± 26.08	242.86 ± 20.20[b]	257.14 ± 57.14[c]	457.14± 119.24[b]
T2 (Concrete Floor)	87.50 ± 22.66	175.00 ± 25.00[b]	125.00 ± 25.00[b]	362.50± 73.04[b]
T3 (Elevated Plastic Slatted Floor)	50.00 ± 18.90	87.50 ± 22.66[a]	62.50 ± 26.31[a]	137.50± 32.39[a]
n	08	08	08	08
SEM	13.560	18.445	26.544	51.959
P value	0.157	0.001	0.005	0.008

[abc]Means with different superscripts column wise differ significantly **(P<0.01)

[#]Each value is an average of eight observations; n = No. of animals in each treatment;

P = Probability Value; SEM: Standard Error Mean

Statistical analysis of the data revealed a significant (P<0.05) difference in dirt score among three floor types and lowest dirt score was observed in lambs kept in T3 group. Higher dirt score indicated that the lambs reared on concrete floor were dirtier than lambs on mud floor whereas, lambs reared on elevated plastic slatted floor (low score) were cleaner than other two groups. This could be due to the fact that the faeces voided passed through the gaps in the slatted floor and also the consequent clean floor. The present findings were supported by Tharuntej *et al.* (2020) who observed the significant effect of floor on dirt score in lambs. The findings are dissimilar with Divate (2014), who found that there was no significant effect of floor type on the cleanliness score.

The initial EPG count of experimental ram lambs were 114.29 ± 26.08 in T1 (mud floor), 87.50 ± 22.66 in T2 (concrete floor) and 50.00 ± 18.90 in T3 (elevated plastic slatted floor). At the end of the experiment the EPG count were 457.14 ± 119.24 in T1 lambs, 362.50 ± 73.04 in T2 lambs and

Table 4. Hoof Length (cm) of Nellore ram lambs under different floor types

Floor Type	Initial Hoof Length (cm)	Fortnightly Hoof Length# (Mean ± SE; cm)							
		1	2*	3**	4**	5**	6**	7**	8** (Final Hoof Length)
T1 (Conventional Mud Floor: Control)	2.81 ± 0.13	2.80 ± 0.06	2.81 ± 0.05[a]	2.83 ± 0.05[a]	3.19 ± 0.07[a]	3.31 ± 0.07[a]	3.46 ± 0.08[a]	3.59 ± 0.11[a]	3.81 ± 0.14[a]
T2 (Concrete Floor)	2.78 ± 0.13	2.90 ± 0.13	2.85 ± 0.11[a]	2.94 ± 0.09[a]	3.10 ± 0.10[a]	3.41 ± 0.11[a]	3.56 ± 0.08[a]	3.65 ± 0.08[a]	3.81 ± 0.10[a]
T3 (elevated Plastic Slatted Floor)	2.78 ± 0.10	3.08 ± 0.10	3.19 ± 0.15[b]	3.51 ± 0.18[b]	3.93 ± 0.15[b]	4.21 ± 0.12[b]	4.41 ± 0.12[b]	4.51 ± 0.15[b]	4.78 ± 0.13[b]
N	08	08	08	08	08	08	08	08	08
SEM	0.065	0.063	0.072	0.093	0.104	0.103	0.106	0.111	0.119
P value	0.996	0.202	0.053	0.002	0.001	0.001	0.001	0.001	0.001

[ab]Means with different superscripts column wise differ significantly *(P<0.05), **(P<0.01)
#Each value is an average of eight observations; n = No. of animals in each treatment;
P = Probability Value; SEM: Standard Error Mean

137.50 ± 32.39 in T3 group of lambs (Table 3). There was a significant difference in EPG count of faeces among three treatment groups. The EPG count of T3 group was significantly (P<0.05) lower from second to fourth month and T2 group also recorded lower EPG value in third month of the experiment, indicating lesser incidences of parasitic infestation. Similar findings were observed by Blessy *et al.* (2017) and Ramachandran *et al.* (2017) who found the EPG count of different groups was significant. The present findings were in disagreement with Thiruvenkadan *et al.* (2009), Hansen *et al.* (2012), Mohit *et al.* (2019) and Tharuntej *et al.* (2020) who found the difference between EPG values of different groups was non-significant.

The initial mean hoof length recorded was 2.81 ± 0.13, 2.78 ± 0.13 and 2.78 ± 0.10 cm in mud, concrete and elevated plastic slatted floors, respectively and by eighth fortnight, the hoof length was increased to 3.81 ± 0.14, 3.81 ± 0.10 and 4.78 ± 0.13 cm

in T1, T2 and T3 groups, respectively (Table 4). Statistical analysis revealed significant ($P<0.05$) difference in hoof length among three treatment groups. Higher hoof length (cm) was recorded in T3 group throughout the experiment except the first fortnight. The present findings corroborating the reports of Blessy *et al.* (2017) and Mohit *et al.* (2019), who reported certain health issues associated with floor types. Similar findings were also reported by Tharuntej *et al.* (2020) who observed a non-significantly higher hoof length associated with floor types in lambs.

CONCLUSION

It is concluded that, elevated slatted floor is recommended for rearing of ram lambs for higher BCS, cleanliness (dirt) score and lower EPG count of faeces revealing lower parasitic infestations in lambs together with a periodical hoof trimming. In spite of higher capital investment, elevated plastic slatted floor house offers multiple advantages in terms of hygiene, lowered mortality, less worm load, reduced stress and consequent early marketability of healthy ram lambs and can be considered as an alternative flooring type for increased profitability.

ACKNOWLEDGEMENT

The authors are thankful to the University officers of P.V. Narsimha Rao Telangana Veterinary University, Hyderabad for according permission and for the financial assistance to carry out the research work.

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