Journal of Entomology and Zoology Studies

Available online at www.entomoljournal.com

E-ISSN: 2320-7078
P-ISSN: 2349-6800
www.entomoljournal.com
JEZS 2020; 8(3): 1876-1878

Received: 22-03-2020
Accepted: 24-04-2020

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Effect of floor type on hock health of Sahiwal heifers

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Abstract
The present study was carried out to observe the effect of different flooring types on the hock health of Sahiwal heifers. Twenty four healthy Sahiwal heifers maintained at DDD Farm of ILFC of DUVASU, Mathura were quasi randomly distributed into four groups on the basis of body weight and age. Heifers of first group were reared on concrete flooring (T1) which served as control group, the heifers of second group were reared on Sand flooring (T2), the heifers of third group were reared on Cow Dung bed flooring (T3) and the heifers of fourth group were reared on Rubber mat installed flooring (T4). The animals were exposed to their respective floorings round the clock, for which they were kept in tethered conditions and scoring for hock health was done on a fortnightly basis. There was a significant effect ($P<0.05$) observed on the pooled mean value of hock score which indicated the hock health condition in the manner (T3>T4>T1>T2).

Keywords: Flooring, heifers, hock health, hock score

Introduction
Since the beginning of Livestock production, housing management has always contributed an integral part towards improving animal production and welfare. It has now also been proven scientifically that proper resting behaviour has a directly proportional effect on the overall performance of animals (De Belie, [3] and Sonck *et al*, [8]). During olden times in India, kutcha flooring was traditionally used for flooring of dairy animals in all households due to its comfortable properties. However the then dairy developers concluded that although the kutcha flooring as a part of housing for dairy animals in households was beneficial at small scale, but in intensive housing it hampered the hygienic upkeep of animals Burgstaller *et al*. [2]. Due to this reason there arose a need for other alternative kinds of flooring types for animals which could be used to aid the shortcomings of kutcha Flooring. Livestock markets then started manufacturing various kinds of flooring mats, and bedding materials, which claimed to be of utmost significance in the overall development and health of cows. Although the claims of these available bedding materials like artificial sand bed and beddings like rubber mat are very high, but no scientific information has been recorded properly on their effects experimentally on indigenous dairy animals.
Considering the above mentioned facts study was designed to study the effect of floor type on hock health of Sahiwal heifers.

Materials and Methods
The present experiment was performed at Livestock Farm Complex of U.P. Pandit Deen Dayal Upadhayay Pashu Chikitsa Vigyan Vishwavidyalaya Evam Go Anusandhan Sansthan, DUVASU, Mathura. A total of 24 healthy Sahiwal heifers were selected randomly as experimental animals. The feeding and other management practices for these heifers remained same as normally practiced at the LFC farm. In contrast to normal practice at our farm the experimental animals of present study were secured with a neck rope around the feeding manger. The Sahiwal heifers were divided into four different groups constituting different treatment, as following:

Treatment 1 (T1)	Concrete flooring (Control)
Treatment 2 (T2)	Sand flooring
Treatment 3 (T3)	Compost/cow dung bed flooring
Treatment 4 (T4)	Rubber mat installed flooring

The present experiment was conducted for a period of 3 months (November 20, 2018 – February 20, 2019). All the animals were maintained under uniform feeding and management practices. A hock assessment chart [4] was prepared to score the hock condition based on the hock scoring method devised by Cornell University, as depicted in Figure 1.1. The hock was scored on a score of 1 to 3, on an increasing rate of hock injuries due to accessibility to abrasive surfaces. To do hock scoring also according to an unbiased and authentic method, professors and research scholars of different departments were invited to do the scoring as per the scoring method used. The average of the scores given by scorers was further utilized for statistical analysis. The data obtained in the study was subjected to Standard statistical procedures (Snedecor and Cochran), [7] using SPSS version 19.

Fig 1: Hock assessment chart for cattle [4] (Devised by Cornell University)

Results and Discussion

The hock score (1-3) of heifers of all the four treatment groups were not found to be significantly different (P>0.05) at every 15 days interval during the 3 months trial period. However the pooled mean value of hock score of T2 treatment group was found to be significantly higher (P<0.05) than T3 treatment group and the pooled mean value of hock score of T1 (Control) and T4 group was found to be comparatively higher than T3 treatment group, which has been depicted in Table 1.1.

Table 1: Effect of flooring on the hock score (1-3) in Sahiwal heifers

Day	Treatments				SEM	P value
	T1(Control)	T2	T3	T4		
0	1.20	1.21	1.09	1.18	0.06	0.44
15	1.57	1.38	1.30	1.52	0.10	0.23
30	1.33	1.41	1.18	1.28	0.09	0.32
45	1.73	2.04	1.66	1.68	0.13	0.15
60	1.66	1.84	1.44	1.83	0.12	0.07
75	1.15	1.12	1.11	1.16	0.03	0.64
90	1.26	1.20	1.18	1.24	0.05	0.71
Mean	1.41^{ab}	1.46^{b}	1.28^{a}	1.41^{ab}	0.04	0.01

Mean with different superscript in row differs significantly (P<0.05)

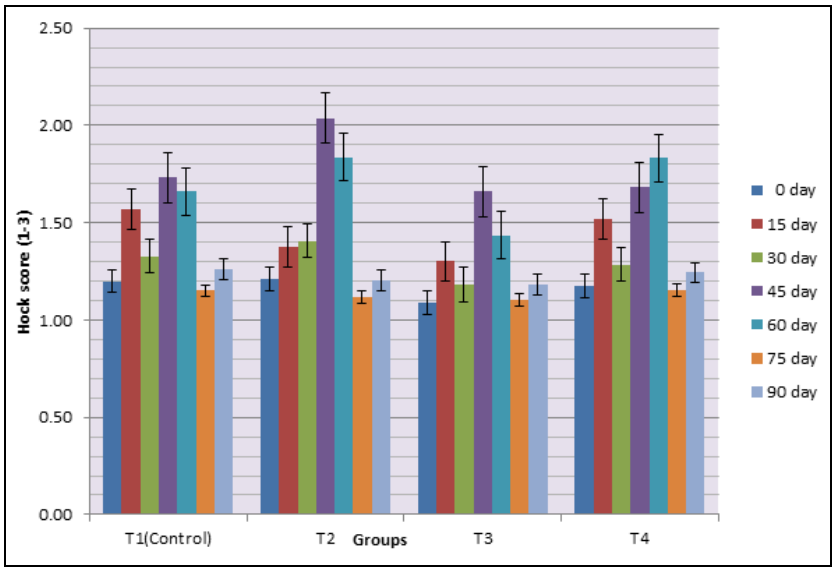

Fig 2: Effect of flooring on the hock score (1-3) in Sahiwal heifers at different days of observation

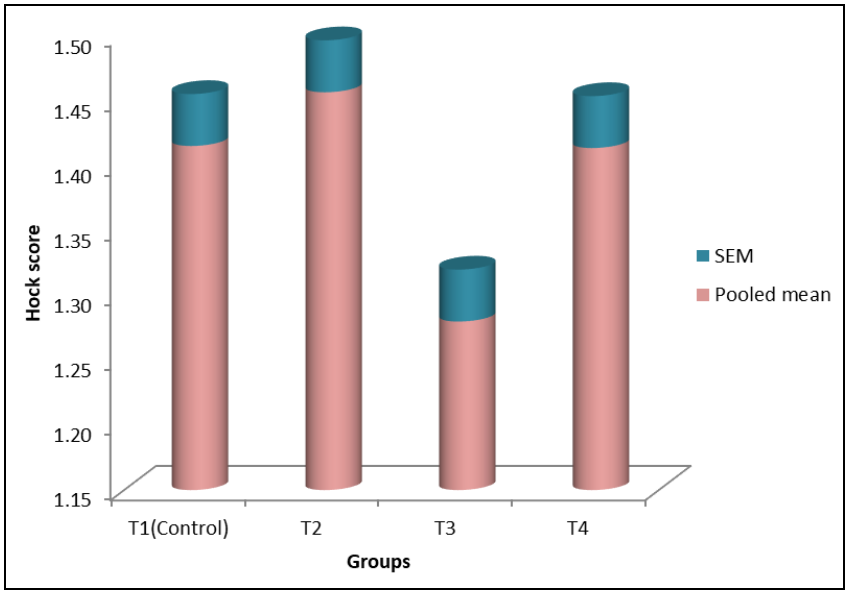

Fig 3: Effect of flooring on the hock score (1-3) in Sahiwal heifers

Our results were in corroboration with the findings of Burgstaller *et al*. [2] who reported that compost dairy barns were found to be a better alternative for common cubicle housing systems in terms of lameness, claw health and animal welfare, as depicted in Figure 1.2 and Figure 1.3.

Similarly Magrin *et al*. [5] reported that a higher prevalence of severe lameness was observed in bulls housed on fully slatted concrete than on Deep litter floorings. (1.86 vs. 0.56%; $P<0.001$). Hence justifying the higher hock score value of T1 (Control) group compared to T3 group, as depicted in Figure 1.3.

However our results are not in alliance with the findings of Niles and Bucklin, [6] who reported the benefits of sand bedding in the milking stalls which included decreased foot and leg problems, increased udder health and overall improved cow comfort.

Our results are also not in agreement with the findings of Andreasen and Forkman, [1] who reported that cows housed in facilities with deep bedded sand stalls have fewer integument alterations on the hocks (e.g. hairless patches, lesions and swellings) compared to mattresses. This might be due to the reason that in our experimental design animals at all times heifers didn't have access to 80-100% dry sand (T2 group), because of the cooler winter season and non availability at every 3 to 4 day due to economic reasons.

Conclusion

It may be concluded that cow dung bedding is the best flooring option for Sahiwal heifers with context to hock health followed by rubber mat flooring and sand bedding is the least favourable bedding option for heifers at least during the season of winters. Results may also differ with change in weather conditions and climatic zones, since our research was conducted in the winter season (in a thermo neutral zone (16 °C – 25 °C).

Acknowledgement

Authors are sincerely thankful to Vice-Chancellor, DUVASU, Mathura and Dean, College of Veterinary Science and A. H., DUVASU, Mathura for providing the scope to conduct the study.

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