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A study on behaviour of sahiwal calves reared on different flooring material

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Abstract
Present investigation was carried out to assess the effect of different flooring material on behaviour of Sahiwal calves. Eighteen sahiwal calves of either sex aged between 6 to 8 months were randomly assigned to three flooring types viz., Concrete floor (control, T1), Concrete bedded with straw floor (T2) and Concrete floor with rubber mats (black, rubber material, 8 mm thick (T3) with six in each group. Control group of calves were housed on concrete floor and treatment group of calves were housed on concrete plus straw floor and concrete with rubber mat floors respectively. Analysis revealed that standing, sitting, licking and sleeping time behaviours were higher in rubber mat groups than the control group. There was significant (P<0.05) difference for sitting time, standing time, sleeping time and licking behavior among the groups except for rumination time. It is concluded that rubber mats proved to be beneficial interms of behavioural responses and welfare of calves.

Keywords: Sahiwal calves, behavioural responses, different flooring material

Introduction
Housing provides shade and protection to cows from excessive solar radiation, rain, cold and wind. The housing system affects behaviour (lying, standing and rumination), production and reproduction of dairy animals in a varying range. Being provided good shelter, lying time of dairy cow depends on the bedding material provided. Cows prefer softer bedding materials for lying and they spent longer time in lying down on soft surface as compared to hard surface Manninen *et al.*, (2002) [15] and Tucker and Weary, (2004) [26]. Now-a-days people seek more attention towards rubber mats as it has positive effects on locomotion and gait in dairy cows (Telezhenko and Bergsten, 2007) [25]. Flooring is one of the most important components of animal housing as far as animal health, growth and welfare are concerned. Cows provided with a softer floor are known to stand up and lie down more frequently as often as cows on concrete (Chapinal *et al.*, 2009) [3]. Soft walking surfaces such as solid rubber flooring have become increasingly popular alternatives to hard floors in the walking area of dairy facilities. A soft floor may reduce the pressure on feet (Nuss *et al.*, 2015) [19] and potentially improve cow comfort and may also reduce the incidence of lameness. Most of the dairy farmers in India prefer concrete floor to house cross bred cows as it can be easily managed and durable. However, concrete floor cannot provide comfort necessities for standing, walking and lying. Out of all the available options for flooring, rubber mat is cheaper, long lasting and available in local market with practically zero maintainence. Still the usefulness of rubber mat is not well studied with respect to sahiwal calves physiological responses, behavior and performance. Therefore, present study was conducted to study the effects of rubber mat flooring on sitting, standing, social licking and rumination behaviours in sahiwal calves.

Materials and Methods
The present study was conducted at Dairy unit of Livestock Farm Complex, College of Veterinary Science, Rajendranagar, Hyderabad, India from May to August 2018 (120 days). Eighteen sahiwal calves of either sex with average body weight of 110.41±7.62 kg and aged between 6 to 8 months were selected from Dairy unit of LFC and randomly divided into three flooring types viz., Concrete floor (control, T1), Concrete bedded with straw floor (T2) and Concrete floor with rubber mats (black, rubber material, 8 mm thick (T3). All the calves in the experiment were housed under conventional housing provided with a floor space of 1.4m^2 / calf in the covered shed with an asbestos roof. Calves in the experiment were fed as per the standard calf feeding schedule followed at Dairy unit. All the three treatments were provided with chopped jowar straw in the morning 8 AM and green fodder (para grass) (ad-libitum) in

the evening 3 PM. 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. The experimental shed was cleaned manually every day and also by forced water spray using jet pump once in a week. Lying and rumination behaviours of all the calves were observed visually for 4 hours a day except feeding time at fortnight interval and over all mean was calculated.

It was studied manually by selecting calves in each group. All the calves, one by one were observed in the same way. Further preference for lying, standing, licking was studied in all three treatments by observing frequency of calves either sitting, standing, licking on three floors at hourly interval. The data were analysed for frequency and one –way analysis of variance by (Snedecor and Cochran, 1994) [24] and comparison of means of different treatment groups was made by Duncan's multiple range test (Duncan, 1955) [7] using SPSS statistical software (version 15.0; SPSS).

Results and Discussion

The effect of flooring types on mean time spent for standing, sitting, licking and rumination is presented in Table 1. Results revealed that the overall mean standing time (minutes) on rubber mats was 831.70 ± 13.34, 788.62 ± 22.40 and 723.27 ± 23.68 on concrete, straw bedded floor respectively.

Table 1: Effect of flooring types on sitting, standing, licking and rumination time (minutes) in sahiwal calves.

Behaviour/Time spent(min)	Concrete (T1)	Concrete plus straw(T2)	Rubber mat (T3)	P -Value
	Mean± S.E	Mean± S.E	Mean± S.E	
Standing *	831.702^{b}±13.34	788.622^{b}±22.40	723.277^{a}±23.68	0.004
Sitting *	657.09^{a}±30.92	670.59^{a}±20.11	761.31^{b}±28.13	0.022
Licking *	12.45^{a} ± 0.38	16.49^{b}±1.47	15.11^{ab}±1.16	0.049
Rumination	484.89 ± 5.90	488.52±24.00	495.39 ± 23.65	0

a, b, c Means with different superscripts row wise differ significantly at p <0.05.

Fig 1: Licking, Sleeping, Rumination and lying behaviours of Sahiwal calves on different floors.

Calves housed on rubber mat flooring, showed highest mean sitting time as compared to other two groups (Haley *et al.*, 2000 [12]; Haley *et al.*, 2001 [11]; Schutz and Cox 2014 and Bhamare 2017) [1]. This shows that the rubber mat had comfortness and positive effect on behaviour.

Standing time (min/day)

The mean standing time (min/day) in Sahiwal calves on different flooring material was highest on concrete floor with 831.70±13.34 min/day and lowest on rubber mat floor with 723.27±23.68 min/day. The difference between standing time was found significant (P<0.05) this indicate that concrete floor provide less lying comfort to calves. The results were in accordance with Herlin (1997) [14], Haley *et al.*, (2001) [11], and Schutz and Cox (2014) whereas inconsistent with Chaplin *et al.*, (2000) [4]; Rushen *et al.*, (2007) [22]; Tucker *et al.*, (2004) [26], Fregonesi *et al.*, (2004) [10], Haufe *et al.*, (2012) [13], Calamari *et al.*, (2009) [2]; Mitev *et al.*, (2012) [17], Cozzi *et al.*, (2013) [6], Margerison *et al.*, (2014) [16]. Elmore *et al.*, 2015 [9] also find similar results in steers preferring rubber mat over slatted concrete.

Sitting time (min/day)

An increased resting time (Lying/Sitting) may result in better quality sleep that leads to an altered growth hormone secretion and improved growth. The mean values of sitting and idling time (min/day) of Sahiwal calves on different flooring was lowest on concrete floor with 657.09± 30.92 min/day and the proportion of lying was significantly (P<0.05) greater in treatment group (rubber mat) with 761.31±28.13 min/day which indicate that rubber mat was most suitable flooring material considering the welfare of

animal and provides best comfort. The results were similar with Herlin (1997) [14]; Chaplin *et al.,* (2000) [4]; Haley *et al.,* (2001) [11]; Rushen *et al.,* (2007) [22]; Olsson *et al.,* (2005), Schutz and Cox (2014) and Earley *et al.,* (2017) [8] but it was contrary with the results of Tucker *et al.,* (2004) [26], Fregonesi *et al.,* (2004) [10], Calamari *et al.,* (2009) [2]

Rumination time (min/day)

Rumination is important physiological behavior of animals which indicates the sound health, good digestion and comfort of animal. The mean value of rumination time (min/day) of Sahiwal calves on different flooring material was lowest on concrete floor 484.89 ± 5.90 min/day and highest on rubber mat floor 495.39 ± 23.65 min/day respectively, but there was no significant difference in rumination time between the treatment groups. Higher rumination time on rubber mats was may be due to more sitting and idling time that might be due to the reason that most of the animals ruminate in sitting position. Since the rubber mat is more comfortable, the calves spend more time for lying down and sitting on the rubber mat floor. Similar reports were also made by Wagh (2010) [27], Choure (2010) [5], Norring (2010) [18], however, Bhamare (2017) [1] found that there was no significant effect of types of flooring on mean rumination time in indigenous Gir cows.

Social licking

Social licking is often associated with a social behaviour of animals. Statistical analyses of data showed that the mean time spent on licking was lowest on concrete floor 12.45 ± 0.38 min/day and highest on straw bedded floor 16.49 ± 1.47 min/day. Further the differences between licking time was found significant ($P<0.05$). The higher frequency of licking in calves might be due to vigorous social interaction between the house mates. The results obtained in the present study are incomparable as the literature on licking behaviour of sahiwal calves on different flooring systems was scanty.

Sleeping time (min/day)

Sleep escpecially REM sleep (Rapid Eye Movement), occurs most often when the animal is resting with neck relaxed and the head resting on the flank. Statistical analyses of data showed that the mean time spent on sleeping was highest on rubber mats 375.41 ± 16.56 min/day and lowest on concrete 321.01 ± 11.29 min/day flooring. The higher duration of sleeping observed in calves on rubber mat was may be due to the comfort provided by the bedding material which was amenable to elicit sleeping drive in calves. The results were in accordance with Rook and Huckle (1997) [21] reported sleeping time for adult cattle to be 366 to 415 min.

Conclusion

From the above results it may be concluded that the Sahiwal calves housed with rubber mat flooring showed better behavioural responses like significantly increased lying, licking and decreased standing time as compared to the other floors. Further studies are required for more understanding of flooring materials.

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