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Effect of Different Floor Space Allowances on Post Weaned Surti Kid's Behavioural Activities

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ABSTRACT

The present experiment was conducted to study the effects of different floor space allowances on behavioural activities of post weaned Surti kids. The experimental groups were *viz.* Control, T_1, and T_2 groups with floor space allowances of 0.8, 0.7, and 0.6 m^2/kid in the covered area while 1.6, 1.4, and 1.2 m^2/kid in the open area, each group having 6 animals. The time spent on manger (mins/2 hrs) was significantly higher in T_1 (100.22 ± 1.25) followed by T_2 (89.44 ± 1.26) and control (77.27 ± 5.76). Time spent on the water trough (sec/2hrs) (53.41 ± 20.45, 42.5 ± 14.01, and 43.58 ± 12.41) and no. of attempts (nos./2 hrs) to manger (30.66 ± 1.41, 30.16 ± 1.07, and 29.5 ± 0.87) and water trough (2.08 ± 0.37, 2.41 ± 0.45 and 2.83 ± 0.54) showed no significant difference among control, T_1, and T_2 groups, respectively. Time spent (mins/2 hrs) standing outside and inside the shed was significantly higher in the control (10.46 ± 2.85 and 21.54 ± 2.18) than in T_1 (2.44 ± 0.64 and 14.76 ± 0.97), and T_2 (6.70 ± 1.93 and 20.21 ± 1.96). No difference was seen in lying time (mins/2 hrs) for both inside (7.60 ± 3.38, 1.72 ± 0.91, and 1.04 ± 0.49) and outside (0.94 ± 0.47, 0.13 ± 0.10, and 1.71 ± 1.05) and also in agonistic behaviour (nos./2 hrs) such as chasing (4.66 ± 1.34, 4.08 ± 0.73, and 3.50 ± 0.62) and butting (1.91 ± 0.49, 1.41 ± 0.31, and 2.33 ± 0.61) influenced among control, T_1, and T_2 groups, respectively while the frontal clash in control (11.08 ± 1.01) and T_1 (8.58 ± 1.09) was significantly higher ($P<0.05$) than in T_2 (6.91 ± 0.98) group. The study indicates that animals were able to express normal behaviour in different floor space allowance. However, feeding behaviour was better in group of animals with 12.5% less floor space allowances than BIS recommendation.

HIGHLIGHTS

- Effect of stocking density on Surti kid.
- Animals were able to express normal behaviour in different floor space allowance.

Keywords: Surti kid, behaviour, floor space allowances

According to the 20th livestock census, there were 148.88 million goats worldwide with an increase of 10.14% compared to previous census (BAHS, 2020). Although housing is essential to goat husbandry, its significance increases as the system changes from extensive to intensive. Raising a number of animals in a less space is what intensive production is known for; this has an impact on the behaviour and productivity of the animals (Castillo-Trujillo *et al*., 2020).

It is well known that group feeding encourages social interaction, which leads to an increase in feed intake, a more even growth rate, and improved social behaviour in comparison to individually fed animals (Titto *et al*., 2010). Feed and water intake, as well as hostile behaviour, rise as the number of animals in the pens rises (Van *et al*., 2007). The accessible floor space to animals affects their feeding, lying, and standing behaviour (Centoducati *et al*., 2015).

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It is also observed that inadequate space availability often leads to the development of abnormal behaviour which can not only be detrimental to oneself but also to other animals in groups (Manson *et al*., 2007). Also, Goats can change the frequency of behaviour following the climatic condition, exhibiting a higher frequency of more active behaviour in the morning, during colder hours as compared to the hotter period of the day (Leme *et al*., 2013).

Behaviour is considered to be the primary indicator of welfare for an individual and its adaptation to its surrounding. It also reflects the immediate response of an animal to its interacting environment (Metz *et al*., 1997). In conditions of high population concentration, animals cannot avoid a violation of their individual space, which can result in increased agonistic interactions and social stress (Paranhos da Costa and Costa e Silva, 2007). It is seen that goats that are kept at higher density show more offensive and defensive behaviours, but hardly any differences are seen in socio-positive behaviours between treatments (Vas *et al*., 2013). Loretz *et al*. (2004) observed that the reduction in floor space led to a reduction in the resting time. Agonistic behaviour increased linearly with an increase in the group size which can be explained as the reason for reduced individual distance, compelling individuals to interact with the restricted opportunity of escape from the attacker. Therefore, the present experiment was conducted to access the effect of provision of different floor space allowances on behaviour of Surti kids.

MATERIALS AND METHODS

Location and ethical compliance

The present study was conducted at Livestock Farm Complex (LFC), College of Veterinary Science and A.H., Anand. This experimental protocol was approved by the Committee for the Purpose of Control and Supervision of Experiments on Animals (CPCSEA) after recommendation by Institutional Animal Ethics Committee (IAEC) and all the animals were managed as per the standard guideline (F. NO. 342/LPM/21 CPCSEA dated 22-04-2021).

Experimental animals and management

The present experiment was conducted on eighteen post weaned Surti female kids and was randomly selected on the basis of age and body weight. Experimental animals were distributed into three treatment groups *i.e*. Control, T_1, and T_2 with floor space allowances of 0.8, 0.7, and 0.6 m^2/kid in the covered area while 1.6, 1.4, and 1.2 m^2/kid in the open area respectively, each having 6 animals (Table 1). Animals were reared in a fully monitored well ventilated asbestos roof house constructed in an east-west direction having a kaccha floor with proper hygienic maintenance. The required daily quantity of total mixed ration (TMR) was prepared by mixing finely grounded sorghum hay and Nutri-power concentrate mixture in ratio 60:40 (ICAR, 2013).

Behavioural observations

The behavioural observations were studied for two rounds during the daytime *i.e.* 2 hours in both, the morning and the afternoon (after one hour of offering morning and afternoon feed) during mid of the experimental period *i.e.* on 56^{th} day. All the experimental animals from each treatment group were identified by the number written on both sides of the belly with black paint and were being observed by PTZ IR camera (2.0 MP, Model DS-2DE22021-DE3: HIK vision). Two cameras, one for the covered and the other for the uncovered area were set up in each pen, which was connected to Network Video Recorder (DS-7700 series embedded NVR; Model no. DS-7716NI-14;14;HIK vision) for data recording. Behaviour activities such as time spent on manger, water trough, standing, lying, attempt to manger and water trough and frequency of agonistic behaviour were recorded.

STATISTICAL ANALYSIS

The observations of various parameters were analysed using a factorial completely randomized design (Snedecor and Cochran, 1994).

RESULTS AND DISCUSSION

The data pertaining to behavioural activity (Table 2) revealed that the mean time spent on the manger (mins/2 hrs) was significantly higher ($P<0.05$) under T_1 (100.22 ± 1.25) followed by T_2 (89.44 ± 1.26) and the least time was spent on the manger by the control group (77.27 ± 5.76) groups. This observation might be due to the reason that animals kept under less floor space allowance had

Table 1: Experimental treatment groups

Groups	Floor space allowances (m^2/kid)		Modifications in floor space allowances	Number of kids in each group
	Covered area	Open area		
Control	0.8	1.6	As per BIS standard	6
T_1	0.7	1.4	12.5 % less than BIS standard	6
T_2	0.6	1.2	25.0 % less than BIS standard	6

Table 2: Behavioural observation of different treatment groups

Attributes	Control	T_1	T_2
Time spent on manger (mins/2 hrs)	$77.27^{x} \pm 5.76$	$100.22^{z} \pm 1.25$	$89.44^{y} \pm 1.26$
Attempt to manger (nos./2 hrs)	30.66 ± 1.41	30.16 ± 1.07	29.5 ± 0.87
Time spent on water trough (sec/2 hrs)	53.41 ± 20.45	42.5 ± 14.01	43.58 ± 12.41
Attempt to water trough (nos./2 hrs)	2.08 ± 0.37	2.41 ± 0.45	2.83 ± 0.54
Time spent standing inside shed (mins/2 hrs)	$21.54^{y} \pm 2.18$	$14.76^{x} \pm 0.97$	$20.21^{y} \pm 1.96$
Time spent standing outside shed (mins/2 hrs)	$10.46^{y} \pm 2.85$	$2.44^{x} \pm 0.64$	$6.70^{xy} \pm 1.93$
Time spent lying inside shed (mins/2 hrs)	7.60 ± 3.38	1.72 ± 0.91	1.04 ± 0.49
Time spent lying outside shed (mins/2 hrs)	0.94 ± 0.47	0.13 ± 0.10	1.71 ± 1.05
Butting (nos./2 hrs)	1.91 ± 0.49	1.41 ± 0.31	2.33 ± 0.61
Chasing (nos./2 hrs)	4.66 ± 1.34	4.08 ± 0.73	3.50 ± 0.62
Frontal clash (nos./2 hrs)	$11.08^{y} \pm 1.01$	$8.58^{xy} \pm 1.09$	$6.91^{x} \pm 0.98$

Mean with different superscripts (x, y, and z) in a row differ significantly ($P<0.05$).

less access to the area for other activities, so animals were more engaged in eating as compared to animals kept under standard BIS recommendations. However, attempt to manger was comparable among three treatment group. The present study is in accordance with the finding of Averós *et al*. (2014) who also observed that eating activity was more in less space allowances. Eating behaviour was recorded higher in groups of animals with less floor space allowances by Thakur *et al*. (2016) which are in support of the present study. Similarly, time spent on water trough and attempt to water trough did not differ significantly among the three treatment groups.

The result revealed that the treatment group significantly ($P<0.05$) influenced the time spent standing inside the shed. The average time spent standing inside the shed (mins/4 hrs) under control (21.54 ± 2.18) and T_2 (20.21 ± 1.96) was at par but significantly ($P<0.05$) higher than T_1 (14.76 ± 0.97). The mean time spent standing outside the shed (mins/2 hrs) was significantly higher in control (10.46 ± 2.85) as compared to T_1 (2.44 ± 0.64) however, T_2 (6.70 ± 1.93) was at par with both Control and T_1. The present study is in accordance with the findings of Leme *et al*. (2013) who observed more standing time in two-lambs housed pens than in collectively housed. Engeldal *et al*. (2013) observed significantly higher ($P<0.05$) standing behaviour (frequency) in low density (155.91) than in high stocking density (125.67) which agrees with the above study. Irrespective of treatment group time spent on lying both inside and outside the shed was non-significantly affected by the different floor space allowance among three treatment groups.

Agonistic behaviour of goat such as butting and chasing was non-significantly affected by the different floor space allowance. However, frontal clash was reported to be significantly higher ($P<0.05$) in control (11.08 ± 1.01) than T_2 (6.91 ± 0.98) while T_1 (8.58 ± 1.09) was at par with both control and T_2 which might be due to reason that more space allowances led to the expression of agonistic behaviour and animal tried to achieve the dominance over other for same space. The result of frontal clashes in the present experiment agrees with the study of Anderson *et al*. (2007) who observed more frequency of frontal clashes in the high resting areas (3.7 ± 1.1) followed by medium and small resting areas. Similarly, Loretz *et al*. (2004)

observed a non-significant effect of space allowances on agonistic behaviour which is in agreement with the result of present findings on butting and chasing agonistic behaviours.

CONCLUSION

The goats reared under 12.5% less floor space allowances than BIS recommendation spent significantly more time on manger as compared to the other two groups. However, time spent on the water trough and no. of attempts to manger and water trough was unaffected by different floor space allowances. The goats reared on normal BIS recommended floor space allowance preferred to spend significantly higher time standing inside and outside the shed as compared to goats reared under 12.5 and 25% less floor space allowances. No difference was seen in lying time among the treatment groups. Agonistic behaviour such as chasing, and butting was not influenced while the frontal clash in floor space allowances of 0.8 and 0.7 m^2/animal was significantly higher ($P<0.05$) than in group with floor space allowances 0.6 m^2/animal.

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