



**RESEARCH ARTICLE**

**BEHAVIOURAL PATTERNS AND BODY CONDITION SCORE IN RELATION TO DIFFERENT REARING SYSTEMS ON SANGAMNERI GOATS**

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**ABSTRACT**

The present study entitled “Growth performance and behaviour pattern of Sangamneri goat under different rearing systems” was undertaken. For this study, twenty one (21) adult female Sangamneri goats around two years of age with uniform body weight were under taken. These goats were randomly distributed into three groups of equal number (7 each). Group (T0) allowed to browse on “jungle grasses” and for (T1) group allowed to browse on “jungle grasses” with supplementation of commercial concentrate and (T2) group allowed to complete stall feeding with supplementation of commercial concentrate. The experiment was conducted during summer season for a period of three months (90 days). The parameters studied were behavioural patterns and body condition score under different rearing systems. The average rumination and resting (idling and sleeping) time (min/day) of goats are higher in stall feeding system than browsing systems. The average daily total water intake (lit/day) and behavioural parameters like total feeding (browsing and grazing), drinking and walking time of goats were significantly ( $P<0.05$ ) higher under browsing (T0) and browsing with concentrate supplementation (T1) group than stall feeding with concentrate supplementation (T2) group. The rearing systems does not affect the weekly average defecating and urinating behavior as well as does not show much variation in body condition score (BCS) of Sangamneri goats. Thus, from above findings, it can be concluded that, stall feeding with concentrate supplementation and browsing with concentrate supplementation systems are a better option for rearing Sangamneri goat breed.

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**INTRODUCTION**

Animal behaviour is the expression of an effort to adapt or adjust to different internal and external conditions, i.e. behaviour can be described as an animal's response to a Stimulus (Blackshaw, 1986). Knowledge of behavior of goats while grazing/browsing is essential for the improvement carried out regarding this aspect. The main activities of goats while let loose for grazing in pasture land are; Browsing, Grazing, Lying, Standing, Idling, Walking, Ruminating, Interaction and other which includes Drinking, Scratching and Self-grooming. Knowledge of behavioral patterns of animals helps to create suitable environment for making the best use of resources and to increase productivity. Further, thorough knowledge of animal behaviour is an effective tool for proper management of livestock. It also helps to understand and assess the suitability of the management system.

The farm animal management which leads to fighting, injury or extreme fear can result in reproductive failure, poor feed conversion ratio, reduced carcass value or increased mortality (Fraser et al., 1990).

**MATERIALS AND METHODS**

The present study entitled “Study on growth performance and behaviour pattern of Sangamneri goat under different rearing systems” was carried out at “Sangamneri Goat Unit” of instructional Livestock Farm Complex (ILFC) and Department of Livestock Production and Management of Krantisinh Nana Patil College of Veterinary Science, Shirwal, Tal. Khandala, Dist. Satara (M.S.). The research was carried out during the months of April to July, 2016, where Sangamneri goats were housed according to standard managemental practices of loose housing system and let loosed for browsing on “jungle grasses” ad. lib. around the farm premises for seven hours (10.00am – 5.00pm) a day on naturally grown open pasture land. Drinking water will be provided two times during the confined hours of the day. For this experiment, twenty one

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(Setianah *et al.*, 2004) adult female Sangamneri goat around two year age old with uniform body weight were under taken. These goats were randomly distributed into three groups of equal number (07 each). Group (T0) allowed to browse exclusively on "jungle grasses" and for (T1) group allowed to browse on "jungle grasses" with supplementation of commercial concentrate and (T2) group allowed to rare on complete stall feeding with supplementation of commercial concentrate ration. Deworming and Vaccination carried out at college farm routinely as per schedule. Pre-adoption period of 15 days was given to all three groups before starting research work.

### Behavioural Patterns

During the experiment, the behavior of animal was recorded weekly for 24 hrs of a day for all three groups. Behavioural patterns recording was done by direct visual observation from standing outside the field and at corner of shelter, so as animal doesn't feel any disturbance in shelter and while grazing.

- **Grazing behavior:** Goat standing or lying down, head down taking mouthfuls of herbage, searching for herbage, manipulating it in the mouth.
- **Browsing behavior:** Goat standing head up word taking mouthfuls of shrubs, searching for shrubs, trees etc., manipulating it in the mouth.
- **Ruminating behavior:** Goats idling or lying down, chewing at regular intervals followed by swallowing one bolus and regurgitation of the next.
- **Idling behavior:** Goat standing or lying down, opened or closed eyes, but no other overt activity.
- **Defecating behavior:** Time spent for defecation purpose during a day.
- **Urinating behavior:** Times spent for urination purpose during a day.
- **Drinking behavior:** Time spent for drinking purpose during a day.
- **Sleeping time behavior:** Time spent for sleeping purpose during a day.
- **Walking behavior:** Goat standing, head up and moving from one place to another.
- **Agonistic behaviour:** Goat standing or lying down and showing aggression.

## RESULTS AND DISCUSSION

Study of behaviour of animals under specific conditions is very important to assess animals comfort and welfare. Animal comfort can be indicated by behaviour of the animal under a set of atmosphere. Supplementary feeding that is to be applied to complement the inadequacy of pasture can also have impact on behaviours to be displayed by the animal.

### Grazing Behaviour

The observations pertaining to the grazing behaviour were (min/day) recorded once in a week under different rearing systems as presented in table. The overall average grazing time (min/day) of Sangamneri goat under grazing with concentrate supplementation feeding system was  $49.29 \pm 1.05$ . The overall average grazing time (min/day) of Sangamneri goat under stall fed with concentrate supplementation feeding system (T2) was not observed as these groups was fed install fed condition.

The significant difference ( $P < 0.05$ ) was observed for grazing time of Sangamneri goats between different rearing systems. (T0) group have significantly ( $P < 0.05$ ) higher grazing time than (T1) group. These findings are in agreement with the reports of (Raats, 1988), (Bordi *et al.*, 1991), (Khound *et al.*, 1996), (Yurtman *et al.*, 2005) and (Yong Chen *et al.*, 2013) as they found that control group (without any supplementation) showed significantly ( $P < 0.001$ ) higher grazing activity than supplemented animals. Also, goats spent less time for grazing and more time for browsing. Significantly ( $P < 0.05$ ) higher grazing time was observed in browsing group (T0) as compared to goat under grazing with concentrate supplementation (T1) rearing system. The grazing time was less in the group supplemented with concentrate mixture might be due to the dry matter requirement of animal was partially fulfilled by the concentrate ration. It was also revealed that, goats have the habit of taking fodder frequently, but, for a short period of time only.

### Browsing Behaviour

The observations pertaining to the browsing behaviour were recorded once in a week under different rearing systems as presented in table. The overall average browsing time (min/day) of Sangamneri goat under grazing with concentrate supplementation feeding system was  $220.43 \pm 2.01$ . The overall average browsing time (min/day) of Sangamneri goat under stall fed with concentrate supplementation feeding system (T2) was not observed as these groups was fed install fed condition. There was significant difference ( $P < 0.05$ ) in browsing behaviour of goats under the control group (T0) which maintained on grazing only and the other group (T1) which was maintained on grazing along with concentrate supplementation. The average browsing time was significantly ( $P < 0.05$ ) lower in supplemented groups compared to control group which might be due to the partial fulfillment of dry matter requirement of supplemented group. These findings are in agreement with (Setianah *et al.*, 2004), (Annicchiarico *et al.*, 2007), (Sharma *et al.*, 1997), respectively, concluded that, the Jamunapari and Barbari goats spent more time 52.9–62.0% on browse during summer (266.9 min). (Animut *et al.*, 2005) Taken visual observation for 24 hr, they also found that time spent on browsing (feeding) was 52.7% of active feeding time. (Njoka-Njiru *et al.*, 2001) concluded that, in Toggenburg goat breed, the behaviour like feeding in dry period per 12 hrs observation time was 7.26 hr. Significantly ( $P < 0.05$ ) higher total feeding time (grazing and browsing) was observed in grazing (T0) group as compare to other groups, and these findings are in agreement with the findings of (Khound *et al.*, 1996). These higher times for feeding activity in grazing group may due to more time require to search feed to satisfy their hunger.

### Ruminating Behavior

The observations pertaining to the ruminating behavior (min/day) were recorded once in a week under different rearing systems as presented in table. The overall average rumination time (min/day) of Sangamneri goat under stall fed with concentrate supplementation feeding system was  $385.71 \pm 2.45$ . There was significant ( $P < 0.05$ ) difference among the groups for rumination time. The overall average rumination time of Sangamneri goats under stall feeding (T2) was significantly ( $P < 0.05$ ) higher compared to (T0) and (T1) groups.

**Table 1**

Sr no.	Particular	Browsing Group	Browsing with Concentrate Supplementation Group	Stall fed with Concentrate Supplementation Group	Results	CD value (0.05)
1	Grazing time (min/day)	54.17 <sup>b</sup> ± 1.11	49.29 <sup>c</sup> ± 1.05	.....	Significant	3.934
2	Browsing time (min/day)	227.85 <sup>a</sup> ± 2.37	220.43 <sup>b</sup> ± 2.01	.....	Significant	5.150
3	Ruminating time (min/day)	327.85 <sup>b</sup> ± 2.37	311.28 <sup>c</sup> ± 1.78	385.71 <sup>a</sup> ± 2.45	Significant	6.386
4	Idling time (min/day)	199.57 <sup>b</sup> ± 3.53	206.86 <sup>b</sup> ± 3.68	214.95 <sup>a</sup> ± 3.60	Significant	10.341
5	Defecating time (min/day)	3.01 <sup>NS</sup> ± 0.10	3.04 <sup>NS</sup> ± 0.11	3.08 <sup>NS</sup> ± 0.11	Non-Significant	13.221
6	Urinating time (min/day)	2.99 <sup>NS</sup> ± 0.10	3.02 <sup>NS</sup> ± 0.11	3.05 <sup>NS</sup> ± 0.11	Non-Significant	13.254
7	Drinking time (min/day)	7.02 <sup>a</sup> ± 0.11	6.98 <sup>a</sup> ± 0.09	6.02 <sup>b</sup> ± 0.11	Significant	0.311
8	Sleeping time (min/day)	377.31 <sup>b</sup> ± 1.63	376.01 <sup>b</sup> ± 1.64	496.59 <sup>a</sup> ± 0.96	Significant	4.165
9	Walking time (min/day)	196.47 <sup>a</sup> ± 2.51	197.10 <sup>a</sup> ± 2.57	79.90 <sup>b</sup> ± 1.034	Significant	6.197
10	Agonistic time (min/day)	5.00 <sup>b</sup> ± 0.09	5.01 <sup>b</sup> ± 0.11	7.02 <sup>a</sup> ± 0.11	Significant	0.300
11	Body condition score (5 point scale).	2.87 <sup>NS</sup> ± 0.06	3.02 <sup>NS</sup> ± 0.10	3.21 <sup>NS</sup> ± 0.13	Non-Significant	---

These findings are in agreement with the reports of (Bell and Lawn, 1957) and (Keskin *et al.*, 2010). These higher rumination times may be due to higher daily feed intake stall fed group as compared to other groups. Also rumination time in gazing only group (T0) was significant ( $P<0.05$ ) higher compared to the supplemented group (T1). These findings are in agreement with (Moon *et al.*, 1994), who studied the rumination behaviour over a 24 hour period, with supplementary feeding of concentrate. (Rai and Pandey, 1980), was found that, the average rumination time was 380 min/day. (18) Also reported similar findings like rumination time was 331 (min/day).

### Idling Behaviour

The observations pertaining to idling behaviour were (min/day) recorded once in a week under different rearing systems as presented in table. The overall average idling time (min/day) of Sangamneri goat under stall fed with concentrate supplementation feeding system was  $214.95 \pm 3.60$ . There was significant ( $P<0.05$ ) difference among the groups for idling time. The overall average idling time of Sangamneri goats under stall feeding (T2) was significant ( $P<0.05$ ) higher compared to T1 and T0 groups. Also idling time in supplemented group (T1) was significant ( $P<0.05$ ) higher compared to the gazing group (T0). These findings are in agreement with the reports of (Khound *et al.*, 1996) and (Keskin *et al.*, 2010). Similar findings are also reported by (Animut *et al.*, 2005), so that time spent on idling on 24 hr basis was 15.9%. However, (Eoni, *et al.*, 2006) reported that, the concentrate level in the ration had affected the time spent in idling. The maximum idling time was observed during the whole period of experiment in all the three groups. This may be due to extreme summer season. In stall feeding (T2) the idling time was significantly significant ( $P<0.05$ ) higher as the animals were confined in the house for the period of 24 hrs.

### Defecating Behaviour

The observations pertaining to the defecating behavior (min/day) were recorded once in a week under different rearing systems as presented in table. The overall average defecation time (min/day) of Sangamneri goat under stall fed with concentrate supplementation feeding system 58 was  $08 \pm 0.11$ . The frequency of defecation found to be in average of 8-10 /day /animal for all the three groups. The non-significant difference was observed for defecation time in Sangamneri goats under different rearing systems. The average time spent by the Sangamneri goats over defecation was nearly same in all groups.

These findings are in agreement with those reported by (Yurtman *et al.*, 2005), who found that, concentrate feed allowance had non-significant effect on defecation behaviour. (Keskin *et al.*, 2010), also concluded that, the behavioural responses of lambs were significantly affected by feed refreshing frequency except for the other behaviours like defecating. (20) Stated that, the defecation frequency of male goats kept in stall fed on concentrate mixture and gram straw was 9.0/day.

### Urinating Behaviour

The observations pertaining to the urinating behavior (min/day) were recorded once in a week under different rearing systems as presented in table. The overall average urination time (min/day) of Sangamneri goat under stall fed with concentrate supplementation feeding system was  $3.05 \pm 0.11$ . The frequency of urination found to be in average of 7-9 /day /animal for all the groups. The non-significant differences were observed for the duration of urination behaviour in Sangamneri goats under different rearing systems. The average time spent by animals over urination was nearly same in all groups. This might be due to increase water requirement of body in summer. The urination frequency was low might be due to the heat stress over animals as in summer season. These findings are in agreement with those reported by (Yurtman *et al.*, 2005), he observed that, concentrate feed allowance had no significant effect on urination behaviour. (Rai and Pandey, 1980), found that, the frequency of urinating behaviour in male goats kept in stall fed on concentrate mixture and gram straw was 9-11/day/ animal.

### Drinking Behaviour

The observations pertaining to the drinking behaviour (min/day) were recorded once in a week under different rearing systems as presented in table. The overall average drinking time (min/day) of Sangamneri goat under stall fed with concentrate supplementation feeding system was  $6.02 \pm 0.11$ . There was significant ( $P<0.05$ ) difference among the groups for drinking time. The overall average drinking time of Sangamneri goats under (T0) and (T1) groups was significantly ( $P<0.05$ ) higher compared to stall feeding group (T2). Higher drinking behaviour seen in T0 and T1 may be due to grazing in extreme summer month's causes heat stress and also availability of dry grasses only, which may leads to increase water requirement. Goats of group T2 were confined in house for the period of 24 hrs and feeding with greens may leads to less water consumption. These findings are in agreement with the reports of (Khound *et al.*, 1996), found more drinking time in grazing group than stall fed goats,

(Yurtman *et al.*, 2005) found that, concentrate feed allowance had non-significant effect over the time spent for water intake. (Daya *et al.*, 1996) who observed that, the goats spent  $1.2 \pm 1.0$  min/day (0.1%) of time for drinking purpose in 24hr at temperature  $13.8 \pm 0.4^\circ\text{C}$ . These findings are contraindicated with the reports of (Keskin *et al.*, 2005) who found that, the goats had spent 2.7% time in drinking purpose in observation time.

### Sleeping Behaviour

The observations pertaining to the sleeping behaviour (min/day) were recorded once in a week under different rearing systems as presented in table. The overall average sleeping time (min/day) of Sangamneri goat under stall fed with concentrate supplementation feeding system was  $496.59 \pm 0.96$ . There was significant ( $P < 0.05$ ) difference among the groups for sleeping time. The overall average sleeping time of Sangamneri goats under stall feeding (T2) was significantly ( $P < 0.05$ ) higher compared to T0 and T1 groups. The average time spent by goats for sleeping was nearly same in the T0 and T1 groups. These findings are in agreement with those reported by (Khound *et al.*, 1996) higher sleeping time in stall fed goats than other groups. (Rai and Pandey, 1980) they found that the sleeping behaviour of goats supplemented with concentrate ration lasted for 1- 20 min in day and almost entirely during night, (Keskin *et al.*, 2005) revealed that, the resting activity of goats was 23.9% of observation time which is comparable with the browsing groups of present study. These goats exhibit sleeping behaviour during night and for few minutes (25–30 min) during day time also. Sleeping is an important physiological behaviour which indicates the sound health and comfort of animal. The maximum sleeping time was observed during the whole period of experiment in all the three groups. This may be due to extreme summer season. In stall feeding (T2) group the sleeping time was significantly ( $P < 0.05$ ) higher as the goats were confined in the house for the period of 24 hrs.

### Walking Behaviour

The observations pertaining to the walking behaviour (min/day) were recorded once in a week under different rearing systems as presented in table. The overall average walking time (min/day) of Sangamneri goat under stall fed with concentrate supplementation feeding system was  $79.90 \pm 1.034$ . There was significant ( $P < 0.05$ ) difference among the groups for walking time. The overall average walking time of Sangamneri goats under T0 and T1 groups was significantly ( $P < 0.05$ ) higher compared to stall feeding (T2). Higher walking behaviour seen in T0 and T1 may be due to searching feed during grazing period, but no significant difference seen in both groups. Goats of T2 group were confined for the period of 24 hrs and fed stall which may reduces walking time as compare to other groups. The time spent for walking was fluctuating throughout the experiment in all the groups of goats might be due to considerable fluctuations in temperature during experimental period. The walking time was reduced in some weeks it might be because of increased environmental temperature. These findings are in agreement with those reported by (Braghieri *et al.*, 2009) they also revealed that walking behaviour was lower in summer season.

### Agonistic Behaviour

The observations pertaining to the agonistic behaviour (min/day) were recorded once in a week under different

rearing systems as presented in. the overall average agonistic time (min/day) of Sangamneri goat under stall fed with concentrate supplementation feeding system was  $7.02 \pm 0.11$ . There was significant ( $P < 0.05$ ) difference among the groups for agonistic behaviour. The overall average agonistic time of Sangamneri goats under stall feeding (T2) was significantly ( $P < 0.05$ ) higher as compared to T0 and T1 groups. The average time of agonistic behavior was nearly same in the T0 and T1 groups. These findings are in agreement with those reported by (Braghieri *et al.*, 2009) and (Van, 2006) observed more aggressive behavior in confined goats than free range. (Yurtman *et al.*, 2005) They observed that, concentrate feed allowance had no significant effect on aggression behavior of goats. Significantly ( $P < 0.05$ ) higher agonistic behavior shown by stall group (T2) may be due to competition for getting more quantity of feed in confined area during feeding. Further it was experienced that, goats under supplemented group (T1) had shown significantly ( $P < 0.05$ ) higher aggression behaviour as compared to goats under control group (T0) mostly during supplementation time, may be due to the competition for getting more quantity of feed.

### Body condition score

The overall average body condition score of Sangamneri goat under stall fed with concentrate supplementation feeding system was  $3.21 \pm 0.13$ . The non-significant difference were observed for body condition score of Sangamneri goats under different rearing systems. These findings are in agreement with the findings of (Nsoso *et al.*, 2001). However, these findings are in contrast to the findings of (Honhold *et al.*, 1989) and (Hozza *et al.*, 2013), respectively. In the present study, non-significant results can be probably due to limited period of research work to find out change in BCS. More days may be required to find out change in BCS or may be due to adult age group of goats selected for this research work. However, T2 group have slightly higher body condition score than T1 and T0 group, this may be due to higher feed intake and weight gain than, that of other groups of animal.

### Conclusion

The average rumination and resting (idling and sleeping) time of goats are significantly ( $P < 0.05$ ) higher in stall feeding system than browsing systems. The average behavioural parameters like (browsing and grazing), drinking and walking time of goats were significantly higher under browsing (T0) and browsing with concentrate supplementation (T1) group than stall feeding with concentrate supplementation (T2) group. These parameters which are indicative of less grazing area and may be due to heat stress in summer season for browsing groups. The rearing systems does not affect the weekly average defecating and urinating behavior as well as does not show much variation in body condition score (BCS) of Sangamneri goats. Finally, the results of various parameters of behavioural observation exhibited that, Sangamneri goats under stall feeding were better than browsing / grazing systems.

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