

*Original Research***Effect of Different Housing Shed on Behavior of Surti Goat****Prajakta Jadhav^{1*} and Ankita Killedar²**¹Assistant Professor, College of Veterinary and Animal Sciences, Udgir (Latur), Maharashtra, INDIA²Research Scientist & Head, Reproductive Biology Research Unit, Anand Agricultural University, Anand, Gujarat, INDIA***Corresponding author:** drprajaktavet@gmail.com

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Abstract

Behavior forms an important component sign of the comfort level experienced by the animals. Present study was carried out to at farm located in 'Reproductive Biology Research Unit' of Anand Agricultural University, Gujarat to observe the behavior of flock of 30 Surti goats housed in different housing systems viz., asbestos sheet housing (Group A), green net housing (Group B) and tree shade open housing (Group C). Gujarat has semiarid climatic conditions and the average temperature during the experimental period was 36.58°C. Observations were made for frequencies of activities performed per animal per day on parameters like; feeding, drinking, resting, aggressive behaviour, sleeping, ruminating, grooming and bleating. The values on frequency of feeding dry fodder, drinking, aggressive behavior, resting and bleating in high pitch were significantly different in different housing systems. Green net housing recorded the maximum temperature during all hours of the day and frequency of drinking water in animals housed was higher. In a confined housing i.e., asbestos sheet housing, anxiety i.e., bleating and aggressive behaviour was seen higher. Goats in tree shade open housing were more comfortable as the frequency of resting was higher also frequency of other activities was found to be optimum. All the observations and results suggest that the tree shade housing is the best housing system for Surti goats.

Key words: Surti, Behavior, Goat, Housing System

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Introduction

Surti is a dual purpose (milk & meat) medium size goat breed highly concentrated in Surat district of South Gujarat in Western India (Deshpande *et al.*, 2010). The breed is primarily white in colour. Goat rearing practices are very common in Gujarat and the breeding and rearing practice range from grazing type to stall fed type including semi-stall fed type. The types of housing too vary from thatched house to constructed type of modern houses. No of studies have been carried out to study the rearing/breeding

practices, productive, reproductive performance of the breed at breeding stations as well as on field (Sorathiya *et al.*, 2013; Tyagi *et al.*, 2013 and Tyagi *et al.*, 2015).

Perusal of literature suggests; there are scanty reports regarding ethological study of the breed. Pakhretia and Pirta in 2010 studied the behavior of transhumant Gaddis in their native track. In a study carried out by Briefer *et al.*, 2015, taking various breeds collectively (Sannen, Anglo Nubian, Toggenburg, *etc.*), it was found that during positive situations, goats produced calls with a lower fundamental frequency range and smaller frequency modulations than during negative situations. The domestic goat is a sociable, inquisitive, and intelligent species, which has been domesticated ca. 10,000 years ago (Miranda-de La Lama and Mattiello, 2010). However, stress of habitat may lead to disturbances in these patterns of behaviour (Jørgensen *et al.*, 2007). Present study was carried out to study the effect of different types of housing shed on the behavior of the goats in semi stall fed condition.

Materials and Methods

Duration of Experiment

Experiment was conducted during the period from 20th May to 10th July 2010. Gujarat is a state with semi dried climatic conditions, receiving rainfall from south-west monsoon in the period from mid June to September. The summer season starts from April and lasts till the beginning of rains (mid June). May month being the hottest days of the year in North-West region (<http://www.nios.ac.in/media/documents/316courseE/ch17.pdf>). The duration of the experiment was 50 days which was divided in three phases viz., Phase I (20 May to 10 June) of raised temperature. Phase II (10 June to 30 June) with raised humidity and temperature and Phase-III (30 June to 10 July) with raised humidity and reduced temperature. In rainy season it was difficult to house animals under tree or in green net. Therefore only 10 days were considered in phase-III during rainy season.

Experimental Material and Housing System

Young adult, non-pregnant, non-lactating and healthy females (age range from 2 to 5 years) were selected randomly from the flock of Surti goat farm located in 'Reproductive Biology Research Unit' of Anand Agricultural University, Gujarat. Animals with similar physiological conditions were selected for the experiment. The goats were then divided in three groups' viz., goats to be reared in asbestos sheet housing (Group A), to be reared in green net housing (Group B) and the third group was of goats to be reared in tree shade (Group C).

Tag numbers of each animal in each group were recorded. To accurately record the activities of each goat, the goats were numbered as 1- 10 on their back with the help of paint. This helped to spot the goat and differentiate one from the other. Green nets were raised to house the animals with the help of locally

available material such as bamboo and rope. Since the animals were semi-stall fed, they were kept in the respective housing during day time and then were subjected to close housing at night hours. The Group A, with asbestos sheet shed was however subjected to confinement as the shed was made of cement and concrete. Also the walls of the shed were raised (built by bricks and cement), taking due care for proper ventilation. Tree shed housing was area confined by fencing around trees. The area was such that there was shade all round the day due to presence of trees around. In all groups, the animals were free to roam in the area allotted. The amount of area allotted for each type of housing shed during day time was equal so as to avoid interference of stocking density of habitat.

Recording of Temperature and Humidity

Wet bulb and a dry bulb thermometer were placed in each housing system to record the variation in temperature and humidity. The thermometers were placed on a platform made by raising bamboo sticks 5 feet from ground level at the centre of each housing system. Recordings were done three times a day at 9.00 hrs in the morning, 14.00 hrs in the afternoon and 17.00 hrs in the evening.

Feeding and Drinking

The animals from all the three groups were fed, dry fodder- adlibitum, green tree leaves- (4 kg/animal per day) and concentrate at the rate of 250gm/animal per day in the morning hours. All animals were provided with potable, clean, fresh drinking water all day around. Water was made available by placing 3 drinkers (24 inch diameter and 11 inch depth) at periphery of housing for group B and C. However, drinkers constructed of cement and concrete (20 inch x 60 inch x 15 inch) were available in the asbestos sheet housing (group A).

Weighing

All 30 animals were weighed at three phases during the experimental period. Animals were weighed on fifth day after start of each phase of experiment.

Monitoring and Recording the Observations

All the three groups were monitored personally by the observers assigned to each group separately during the day time from 9.00 hrs to 17.00 hrs. Frequency of the activities performed by the animals was recorded for each animal separately on sheets. For the activity feeding of greens, every time when the goat approached greens and ate them was considered as one unit of activity. The second unit was counted when the goat again approached and ate the greens. Similar system of observation was followed for feeding of dry and drinking. Irrespective of the duration, whenever the animals were found to rest alone or resting in proximity of the companion or sleep, it was considered as one unit of activity. Sleeping was

differentiated from resting as the act to rest with the eyes closed. While resting was considered when the animal was seated/ relaxed but eyes were not closed.

Act of aggression included dashing of heads on one another, pushing one another, head pressing on walls or any act which displayed anxiety or aggression. Every act of rumination was counted when the goats were seen to ruminate. However, mostly they ruminated in resting stage hence the observation was recorded in ruminating as well as resting activity independently. Similar system of recording was followed for activities viz., moving alone, moving in group, grooming, bleating high and bleating low. For the activity of grooming, self grooming as well as grooming of others was considered. However, when the goats were found to groom each other, unit of activity was recorded for the one who is grooming and not for the other who is getting groomed. All the observations were made as each activity performed number of times in the given hours of the day.

Statistical Analysis

Analysis of variance was done using two way model to derive the p-value and conclusions were made base on the results obtained. For analysis, observations were presented as activity per animal per day.

Results and Discussion

It was seen that the average temperature during all hours of the day was relatively higher in green net followed by asbestos sheet and tree shed. The average temperature recorded at hot hours of the day (2pm) was 39.6°C in green net house followed by 39.4°C and 37.4°C in asbestos sheet shed and tree shed respectively. This is justifiable, since exposure to sunlight and heat was relatively lower in asbestos sheet housing and tree housing due to confinement and shade respectively. However, the green nets are perforated which allows the exposure of area under green net to sunlight and heat.

The relative humidity recorded followed a vice-versa trend and was highest in tree shed followed by asbestos and green net sheds respectively. It was more at morning hours (9am) i.e., 69.73%, 61% and 57% in tree, asbestos and green net sheds respectively. However, the average humidity observed for the period of experiment was within the normal range. The middle phase of the experiment recorded highest temperature during hot hours of the day (i.e. 2pm) and averaged up to 40°C (with a minimum of 38°C to a maximum of 42°C). It was also observed that relative humidity in tree shade housing was higher during all three times of the day as compared to other housings. No significant difference was seen in weight of the animals recorded at different phases of experiment. The greens though were made available to the animals at all times of the day, all the animals were found to feed greens during 3-5pm of the day. However dry feeding was prominent during morning hours (9 am-12 noon) in all groups and there was significant difference (p value 0.06) in dry feeding frequency of animals in various groups, being highest

in asbestos sheet housed animals. Average frequency of feeding green was higher in green net housed animals (2.46 ± 0.13) followed by tree shed housed (2.39 ± 0.23) and asbestos sheet (2.15 ± 0.15) (Table 1).

Table 1: Frequency of activities performed by each group (feeding and watering)

Activity	Group A (Asbestos sheet)			Group B (Green Net)			Group C (Tree shade)		
	9 to 12 hrs	12 to 15 hrs	15 to 17 hrs	9 to 12 hrs	12 to 15 hrs	15 to 17 hrs	9 to 12 hrs	12 to 15 hrs	15 to 17 hrs
Feeding Green	0.00 ± 0.00	1.39 ± 0.16	2.15 ± 0.15	0.40 ± 0.10	1.31 ± 0.13	2.46 ± 0.13	0.24 ± 0.06	1.09 ± 0.09	2.39 ± 0.23
Feeding dry	2.80 ± 0.16	2.16 ± 0.13	1.03 ± 0.21	2.41 ± 0.20	1.81 ± 0.15	0.83 ± 0.21	2.83 ± 0.22	1.85 ± 0.18	1.03 ± 0.23
Watering	0.54 ± 0.07	0.83 ± 0.07	0.55 ± 0.08	1.11 ± 0.09	1.51 ± 0.24	0.83 ± 0.14	0.73 ± 0.11	0.78 ± 0.08	0.59 ± 0.08
Ruminating	0.35 ± 0.05	1.48 ± 0.20	1.11 ± 0.12	0.49 ± 0.11	1.36 ± 0.13	1.16 ± 0.20	0.64 ± 0.13	1.65 ± 0.28	1.06 ± 0.15

Since the temperature recorded in green net shed was comparatively higher, the frequency of drinking water during all hours of the day was also higher. During 9am to 12pm the frequency of drinking was 1.11 ± 0.09 , while in the tree shade it was 0.73 ± 0.11 , followed by the asbestos sheet housing, where it was 0.54 ± 0.07 . The frequency of drinking at afternoon hours (12pm to 3pm) was maximum in the animals housed in the green net i.e., 1.51 ± 0.24 . Statistical analysis revealed significant difference in drinking frequency of animals in green net housed goat with a p-value of 0.02.

Most of the time, goats in all groups showed tendency to rest in proximity rather than resting alone. However some animals in all groups were seen to rest alone. Frequency of resting/sleeping was maximum during the afternoon hours in the tree shade animals i.e. 1.53 ± 0.22 followed by the asbestos sheet housed animals and the animals housed in green net (Table 2).

Table 2: Frequency of activities performed by each group (resting and group activities)

Activity	Group A (Asbestos sheet)			Group B (Green Net)			Group C (Tree shade)		
	9 to 12 hrs	12 to 15 hrs	15 to 17 hrs	9 to 12 hrs	12 to 15 hrs	15 to 17 hrs	9 to 12 hrs	12 to 15 hrs	15 to 17 hrs
Resting alone	0.28 ± 0.04	0.35 ± 0.05	0.29 ± 0.03	0.21 ± 0.07	0.36 ± 0.03	0.24 ± 0.05	0.28 ± 0.04	0.66 ± 0.10	0.31 ± 0.06
Resting in proximity	0.50 ± 0.11	1.40 ± 0.25	0.93 ± 0.11	0.35 ± 0.11	1.26 ± 0.23	0.73 ± 0.14	0.33 ± 0.05	1.53 ± 0.22	0.91 ± 0.17
Sleeping	0.01 ± 0.01	0.09 ± 0.02	0.00 ± 0.00	0.04 ± 0.03	0.05 ± 0.03	0.10 ± 0.03	0.06 ± 0.02	0.30 ± 0.05	0.23 ± 0.04
Moving alone	0.33 ± 0.06	0.48 ± 0.12	0.36 ± 0.17	0.55 ± 0.08	0.88 ± 0.23	0.63 ± 0.08	0.51 ± 0.07	0.66 ± 0.08	0.46 ± 0.08
Moving in Group	0.81 ± 0.09	1.09 ± 0.21	0.69 ± 0.19	1.44 ± 0.21	0.98 ± 0.18	1.03 ± 0.32	1.36 ± 0.26	1.13 ± 0.15	1.09 ± 0.15

The frequency was significantly different in all groups (p-value 0.08). However on an average, the animals housed in asbestos sheet displayed resting behavior more frequently. Resting of animals all day can be a sign of boredom due to confinement. The animals in tree shed were found to rest during afternoon hours and were active at other hours of the day due to environment enrichment. Their activities included trying to climb trees or pull the tree leaves as is their natural behavior. On the contrary, confinement and boredom may be the reason that the animals in asbestos sheet displayed resting

behaviour higher in an average. Aggressive behavior such as attacking each other, pushing, head pressing, etc. ranged in average frequency from 0.1 to 0.4 activities per animal per day in all. All the three groups varied significantly (p-value 0.006) with respect to the aggressive activities during the experimental period. However, aggressive behavior and anxiety was higher in asbestos sheet housed animals. They were seen to be aggressive very frequently ranging from 0.30 ± 0.05 times in afternoon to 0.56 ± 0.09 times in the evening hours (Table 3). As stated earlier, since the asbestos sheet housing was a confined type of housing, the animals may have displayed aggression being uncomfortable in confinement.

Table 3: Frequency of activities performed by each group (bleating and aggression)

Activity	Group A (Asbestos sheet)			Group B (Green Net)			Group C (Tree shade)		
	9 to 12 hrs	12 to 15 hrs	15 to 17 hrs	9 to 12 hrs	12 to 15 hrs	15 to 17 hrs	9 to 12 hrs	12 to 15 hrs	15 to 17 hrs
Aggressive behavior	0.54 ± 0.04	0.30 ± 0.05	0.56 ± 0.09	0.18 ± 0.07	0.11 ± 0.05	0.35 ± 0.10	0.11 ± 0.07	0.05 ± 0.05	0.14 ± 0.03
Grooming	1.76 ± 0.38	1.46 ± 0.30	1.10 ± 0.22	1.48 ± 0.24	1.66 ± 0.25	1.08 ± 0.17	1.85 ± 0.15	1.78 ± 0.16	1.24 ± 0.19
Bleating high	0.55 ± 0.08	0.24 ± 0.05	0.36 ± 0.09	0.04 ± 0.04	0.01 ± 0.01	0.08 ± 0.05	0.03 ± 0.03	0.03 ± 0.02	0.05 ± 0.03
Bleating low	0.26 ± 0.03	0.09 ± 0.03	0.06 ± 0.03	0.00 ± 0.00	0.00 ± 0.00	0.08 ± 0.04	0.00 ± 0.00	0.05 ± 0.03	0.00 ± 0.00

It is evident from the fact that the bleating was also significant in animals in asbestos sheet (p-value 0.14). Bleating in high pitch was evident in the asbestos sheet housed animals more often in morning hours (0.55 ± 0.08) and less often in the afternoon (0.24 ± 0.05). It could be due to natural behavior of resistance to confinement in the morning/beginning of the day and adaption with the habitat till the afternoon. As evident in a study carried out by Briefer *et al.*, 2015, it was found that during positive situations, goats produced calls with a lower fundamental frequency range and smaller frequency modulations than during negative situations like separation from conspecifics.

Conclusion

From the experiment conducted, it was seen that tree shade housing was more comfortable than both of the other housing, *i.e.*, asbestos sheet housing and green net housing from behaviour point of view. Green net housing recorded the maximum temperature during all hours of the day; however, no significant effect of the housing was seen on the weight of the animals during the period of the experiment. It was also observed that frequency of drinking in green net housed animals was higher, indicating that the water intake of the goats was increased in the increased temperature zone. Goats in all groups showed tendency to rest or move in group, as is their natural behavior. In a confined housing *i.e.*, asbestos sheet housing, anxiety, bleating and aggressive behavior was seen higher. Goats in tree shade though were most comfortable as the frequency of resting and sleeping was higher in this group during afternoon hours. Thus the observations made, highlight on need of housing goats in open housing system with natural environment rather than housing them in confinement or in artificially prepared temporary housing.

References

1. Briefer EF, Tettamanti F and McElligott AG. 2015. Emotions in goats: mapping physiological, behavioural and vocal profiles. *Animal Behaviour*, 99: 131-143.
2. Deshpande SB. 2010. Morphometric characteristics of Surti goats and socioeconomic status of Surti goat keepers. *Indian Journal of Animal Sciences*. 80 (6): 575–577.
3. Jorgensen GHM and Andersen IL. 2007. Feed intake and social interactions in dairy goats—the effects of feeding space and type of roughage. *Applied Animal Behaviour Science* 107: 239–251.
4. Miranda-de La Lama GC and Mattiello S. 2010. The importance of social behaviour for goat welfare in livestock farming. *Small Ruminant Research*. 90 (1-3): 1-10.
5. Pakhretia S and Pirta RS. 2010. A Behavioural Study of the Sheep and Goats of the Transhumant Gaddis. *Journal of Human Ecology*. 29(2): 93-100
6. Sorathiy LM, Fulsundar AB, Tyagi KK and Patel MD. 2013. Effect of social groups and flock size on economic returns from traditional goat rearing in south Gujarat. *Indian J. Anim. Prod. Mgmt*. 29 (1-2): 102-109.
7. Tyagi KK., Patel MD, Sorathiya LM, Kshirsagar DP, Patel MV and Thakor RB. 2015. Growth Traits and Their Interrelationship In Surti Goats. *Animal Science Reporter*. 9 (3): 105-113
8. Tyagi KK , Patel MD, Sorathiya LM, Fulsundar AB. 2013. Body weight variability in Surti kids under field conditions. *Indian Journal of Small Ruminants*, 19 (1): 211-214.