
A STUDY ON DIURNAL ACTIVITY PATTERN OF SAMBAR DEER (*Cervus unicolor*)

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ABSTRACT

Observations were made on Sambar deer (*Cervus unicolor*) in Arignar Anna Zoological Park at Vandalur. Data on proportion of time spent on various diurnal activities by Sambar Deer was subjected to statistical analysis. The behavioural studies revealed that the deers were most active during 11.00 to 12.00 hrs and at 15.00 to 16.00 hrs which coincides with their feeding time. Testing was pronounced in the morning and afternoon. Statistical analysis showed that no significant differences in characters such as standing, moving and sleeping. The other characters showed variation among individuals.

INTRODUCTION

Sambar deer (*Cervus unicolor*) the native of South Asia, resembling the elk in its body size is the largest and most widely spread among Indian deers. They are not gregarious in behaviour the deer has become common and diurnal in parks and sanctuaries (Israel, 1988). Indian Sambar includes six subspecies two of them are considered endangered (Grzimek, 1968). A thorough knowledge of activity pattern of any animal is necessary to understand its behaviour and any change in it due to biotic or abiotic factors. Huges (1988) has said that animal welfare will suffer when they are unable to perform the normal patterns of behaviour. In review of literature on Sambar deer the informations are very scanty. Few workers like Brander (1927), Prater (1965), Schaller (1967), Krishnan (1972) and Semiadi (1994) have highlighted on morphology, ecology and general behaviour. The lack on monumental work on Sambar may be due to its preference to stay in dense forest covers.

The present study is in the diurnal activity pattern of Sambar deer and in describing the significance in various behavioural activities which might ultimately help in the conservation of this least studied and less understood animal.

STUDY AREA AND METHODS

All works were carried out at Arignar Anna Zoological Park, Vandalur located in Chennai M.G.R. District, 32 km. south of Chennai. The Sambar deers were exhibited in a large dry open moated peninsula type enclosure. The sambar herd consisted of 27 animals involving 9 stags, 13 hinds and 5 fawns. The animals were fed twice once at 11.00 with wheat bran, bengal gram and salt and once at 15.30 hrs with grasses and twigs. The behavioural recordings were made from three selected animals (Stag, hind and its female fawn) from 7.00 to 17.30 in November 1994 using a stop watch and prepared data sheets. Total time studied was 90 hours. Scan sampling method (Altman, 1974) with an interval of one minute was adopted. All observations were made on good weather conditions.

BEHAVIOURAL CATEGORIES

Data was chosen to be mutually exclusive and to cover all commonly occurring behaviours which were divided into two major kinds, activities and inactivities.

Activities: The categories for activities were a) Feeding which includes both grazing and eating concentrate, b) ruminating, c) moving, d) grooming, e) wallowing

Inactivities: Inactive behaviours were resting (standing or sitting in relaxed posture with eyes open; and sleeping (sitting posture with eyes closed and head touching the ground) which were not accompanied by rumination.

In addition observations were made on occasional behaviours such as drinking, vocalising, urination, defecation, suckling, butting and fighting.

RESULT

Activity Time Investments:

Although most of the activities were spread out throughout the day the main activity period was at noon 11.00 to 12.00 and evening 15.00 to 16.00. Resting was pronounced in morning 10.00 to 11.00 and in afternoon 12.00 to 13.00. Feeding reached its peak at 11.00 to 12.00 and at 15.00 to 16.00. Rumination and sleeping showed peak at 9.00 to 10.00 and 13.00 to 14.00 respectively. Moving was observed more at 11.00 to 12.00. Maximum wallowing time was at 11.00 to 12.00 and 15.00 to 16.00. There was no consistent time for high or low grooming activity. The occasional behaviours did not show any definite pattern.

Significance Test:

In order to test the significance in behavioural categories the data was subjected to student unpaired 't' test.

The characters such as standing, moving and sleeping were nonsignificant among individuals. Lying and grooming were nonsignificant among adults but between fawn and adults the significance was high. The other significant behaviours were eating concentrate and ruminating. Grazing was highly significant between stag and fawn but the other two combinations showed low significance. Fawn and stag differed significantly in wallowing but it was nonsignificant between adults (stag and hind), hind and fawn.

Percent of Time Spent:

Stag spends about 40.94% of the day light hours in lying, 23.06% in standing, 9.58% in feeding, 14.38% in rumination and 12.04% in others. Equivalent figures for hind and fawn and 41.58%, 20.31%, 17.04%, 9.73%, 11.34% and 57.81%, 17.52%, 12.19%, 2.23%, 10.25% respectively.

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DISCUSSION

1. Resting:

Observations show that sambar deer in captivity spend about 67.69% of the day time in resting which was pronounced in morning and afternoons after early morning grazing and concentrate feeding respectively (Schaller, 1964; Krishnan, 1972). Fawns spend more time lying and vary significantly from the adults. Lying may be to reduce heat loss and to store energy (McFarland, 1981) which was nonsignificant among adults. Standing too showed significant among the three individuals.

2. Feeding

The feeding periods were most intense periods of daily activity. Feeding is more conditioned reflex because concentrate feed is supplied in morning at 11.00 and grasses and twigs are fed at 15.30. Sambar deer actively grazed and browsed in mornings and evenings and showed preference for grasses (Schaller, 1967), hinds and fawn spent more time in feeding (17.04% and 12.19% respectively) than adult males (9.58%) which may be that males have dominant access to areas of maximum feed availability (Clutton Brook, 1977) or due to lactation in females which doubles food choice (Clutton Brook, *et al.*, 1982). The significant variation in feeding behaviour may be attributable to sex difference (Selender, 1966), age (Patridge and Green, 1985) and to individual difference (Grant, 1976).

3. Rumination

Rumination usually follows early morning foraging and the distinct variation in ruminating time was due to dry matter intake or due to different genotype of the animals (John Hancock, 1952).

4. Moving

Though moving was consistently observed at all times a slight increase was found before and peaks of feeding suggesting a good coordination among the two activities where moving is function of feeding or vice versa. This type of moving from lair to feeding place was stereotyped (Darling, 1937) and showed no significance among the three individuals. Moving as also observed when the animal responded to the visitors offering feed to the deers with small branches, twigs etc. The animals hesitatingly moved towards the visitors to nibble at the greens offered especially in the afternoon hours just prior to the schedule feeding time.

5. Wallowing

Wallowing is a stereotyped activity (Darling, 1937) and was mostly found after feeding. Drinking was found along with wallowing for which the feeding behaviour may be a direct stimulus for drinking (McFarland, 1981). The significant difference in wallowing between stag and fawn and the non significance between hind and fawn suggest that the fawn mostly remains near its mother.

6. Sleep

Sleep in the deer was associated with the afternoon hours for a very short time. Balch (1955) has referred that ruminants rarely sleep because of the need to keep the thorax upright while ruminating and the apparent lack of sleep and the typical lying position are characters of ruminants.

7. Grooming

Though no considered time for high or low grooming activity was observed the significant variation in grooming between the hind and its fawn was due to the filial relationship between them which existed in the form of allogrooming usually by the hind by means of licking (Sridhar, 1992). Stags indulge in autogrooming which differed significantly from the fawn grooming may be preformed for ectoparasite removal (Barton, 1985), reducing social tension between animals (Schino, *et al.*, 1988).

CONCLUSION

Though the deers exhibited various types of behaviours in real life an animal makes decision on whether to continue the current activity or to change to some form of behaviour (McFarland, 1981). The decision criteria influence the order in which the animals go about their daily tasks (McFarland, 1977).

Moreover the attitude of plucking the leaves and twigs from the nearby trees and shrubs by the visitors and feeding it to the deers needs special attention. This is a warning signal to the zoo authorities that no trees/ shrubs of poisonous nature should be planted near the vicinity of the herbivores. Schematic boards should be appropriately placed near the herbivore enclosures warning the visitors not to feed the animals and also to make them understand that the animals are well fed and taken care of and to educate the visitors that their activity of feeding may be injurious to the health of the animal and could result in death of the animals due to poisoning or over-feed. The trees near the enclosures should be properly pruned to the height not accessible to the public to prevent such activities.

As our study describes only the diurnal activity pattern of Sambar deer in captivity in one season a further detailed study extending over the 24 hour period in different seasons might help in better understanding of the Sambar deer and in conservation of this beautiful animal.

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Table 1. Student 't' Analysis of Activities among Stag, Hind and Fawn.

Behaviours	Between S & H	Between H & F	Between S & F
Standing	1.2926 N.S.	1.0200 N.S.	1.9930 N.S.
Lying	0.3436 N.S.	4.1930 **	5.1346 **
Grazing	2.5256 *	2.4245 *	8.3214 **
Eating Concentrate	4.1986 **	8.3636 **	6.9532 **
Ruminating	2.1955 **	5.1620 **	12.1176 **
Moving	0.492 N.S.	0.3696 N.S.	0.8024 N.S.
Grooming	0.0026 N.S.	3.3947 **	3.2323 **
Wallowing	1.5722 N.S.	0.8862 N.S.	2.4764 *
Sleeping	0.0516 N.S.	1.0735 N.S.	1.0705 N.S.

Note:

N.S. : Not Significant (p > 0.05)

* : Significant, (p < 0.05)

** : Highly Significant, (p < 0.01)

Editor's Note : This article is being published against advice of Scientific Editor. The reason for the objection is that, although the manuscript is well-written and the study correctly carried out, the 'study is not addressed to solve any problem that will help the zoo manager to improve his knowledge in animal management."

Scientific Editor's reasons are sound. Many researchers do activity pattern studies (as well as others studied as well) without any practical notion of how the information will help either the man improve his management or the animal to live better. Students in particular sometimes do not think through projects but blindly carry out a study simply because it is straightforward and well known to them. However, researcher's time and energy is too valuable and zoo management's problems too many for this state of affairs to continue. We support our Scientific Editor in his sentiments.

However, since the article is well written and since the authors did further improvements on it when it was returned to them, we are publishing it with an advice that zoo based time budget research should address a specific problem. Scientific editor sent the authors literature to help them formulate such time budget studies in a more problem-solving orientation in future. These can be ordered by anyone interested for price of xeroxing and posting.

As an educationist, I found the present study could be useful in the following way: zoo visitors constantly complain that the animals are not active. Some zoos publish feeding schedules and other activities so that visitors can "schedule" their visit to a particular enclosure during those times. This study could possibly be used to inform visitors when they can see the sambar most active. Scientific editor's remarks below.

Note from Scientific Editor : Observational findings on activity pattern of sambar in captive environment has been presented. Time budget studies are essential to know normal activity schedules of a species and individuals within a group. Such studies are legitimate while dealing with free living wildlife because various ecological factors (e.g. food availability, predator presence, habitat continuity, anthropogenic disturbances, competition from conspecifics and sympatric, seasonality and phenolgy, etc.) determine the activity pattern. However, one has to provide adequate justification while conducting such time budget studies in zoos where almost all these factors are either nonexistent or have only a limited influence on activity and behaviour, i.e. food availability is secure, habitat is restricted, human interferences are predictable, competition is negligible and factors like seasonal variations have only very subtle effect on behaviour.

For the above reasons, zoo based time budget studies should address specific issues and mere activity profiles do not provide any new information that will help the management. For example : to know a) how animals respond to changes made in the exhibit, b) how the activity profile of a (territorial) male changes following the introduction of a female, c) why certain individuals show more begging behaviour, d) whether animals (primates) exhibit any behavioural changes whenever visitors are present, etc. Simple activity pattern studies can only be considered a 'good exercise' for students or researchers who are new to collecting data on animal behaviour.

Readers ! What do you think ? Comments, compliments, criticism WELCOME !