

Research Article

**ACTIVITY PATTERN OF BLUE BULL (*BOSELAPHUS TRAGOCAMELUS*)
IN CAPTIVITY AT ZOOLOGICAL GARDEN, KOLKATA, INDIA**

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Article History: Received 7th February 2014; Accepted 16th July 2014; Published 17th August 2014

ABSTRACT

A study was carried out on Blue bull or Nilgai, *Boselephus tragocamelus* (Pallas, 1766) in the captivity at Zoological Garden, Kolkata during monsoon 2006 to assess their diurnal activity pattern. The activities of the individuals of Blue bull were recorded by using focal animal sample method to determine the time budget of Blue bull in three time periods viz. 09:00 h to 12:00 h, 12:00 h to 15:00 h and 15:00 h to 18:00 h. The behavioral states recorded were feeding, resting, scanning, walking and social (including grooming, aggression, play, fight and submissive). Overall, Blue bull spent their time (Mean + SE) in various activities like feeding (male- 45.83±1.55, female- 45±1.41), resting (male- 31.39±1.33, female-27.87±2.02), walking (male- 14.26±1.19, female-17.59±1.51), social (male- 8.52±1.07, female- 9.54±0.86). Most of the time Blue bull engaged in feeding and resting activities, and no records of fighting activities recorded during the study period. No significant difference found in time spent in basic activities of male and female individuals. Blue bull spent maximum time in feeding during 9:00 to 11:00 h and 15:00 to 18:00 which showed a bimodal pattern; when the temperature was low, while Blue bull spent the greatest amount of time in resting in between 12:00 to 15:00hr. As temperature rose during the daylight hrs, the Blue bull spent more time in resting, rather than feeding.

Key words: Blue bull, Feeding, Scanning, Walking, Social, Time-Budget.

INTRODUCTION

The Blue bull (*Boselephus tragocamelus*) which is commonly called as Nilgai, is the largest antelope native to the Indian subcontinent, and belongs to the Family 'Antilopinae' of Order 'Artiodactyla' (Ellerman and Morrison-Scott 1966; Nowak Paradiso, 1983; Corbet and Hill, 1992; Grubb, 1993). It is widely distributed in the arid and semi-arid zones in the north and northwest India (Blanford, 1888; Prater, 1971). Blue bull is also one of the threatened animals living in close proximity to human settlement (Mallon, 2008). It avoids densely wooded areas and inhabits undulating plains with grass and

patches of scrub (Prater, 1971; Schaller, 1967), and often encountered in agricultural crop fields raiding crops (Chauhan and Sawarkar, 1989; Chouhan and Singh, 1990). Blue bull is both a grazer and browser, but grasses constitute bulk of its diet (Prater, 1971; Mirza and Khan, 1975; Sankar and Vijayan. 1992).

How and where an animal spent its time in various activities is very much important for the need of energy balance and survival of that animal. It is also important that habitat and surrounding of the animal has influences on the basic activities of the animal. Some studies have been carried out on the ecology and behaviour of

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Blue bull in the wild (Lacey, 1969; Acharjyo and Misra, 1973; Mirza and Khan, 1975; Chitampalli, 1983; Sheffield *et. al.*, 1983; Oguya and Eltringham, 1991; Sankar and Vijayan, 1992; Bohra *et. al.*, 1992). Very few investigations have been carried out on the activity patterns of Blue bull in natural condition and in captivity (Sharma, 1981; Oguya and Eltringham, 1991; Bohra *et. al.*, 1992; Goyal and Rajpurohit, 2001). It is needless to emphasize that such studies are crucial for captive management of wildlife. The aim of this paper was to study the activity patterns of Blue bull in various hours of the day in captivity at Zoological Garden, Alipur, Kolkata.

MATERIALS AND METHODS

Study Area

The study was conducted in captivity at Zoological Garden, Kolkata which is one of the largest zoo (64 acres) in India. The Zoological garden houses varieties of animals belong to all vertebrate groups. The study animal *Blue bull* (1 male and 2 females) were kept in an enclosure (40' x 65') situated in the southern part of the Zoo. The enclosure had ground cover comprising of grasses and shade provided by one big sized Tamarin tree (*Tamarindus indica*). While the three sides of the enclosure open for visitors, the northern side was bordered by enclosures of Gayal (*Bos gruensis*) and Hog deer (*Axis porcinus*). The Zoo Garden authority provides food basically consist of different types of grasses in two times per day at 0800 hr and 1600 hr. During monsoon the average temperature of the zoo garden is about 34C and generally the temperature maximum at the noon hours and minimum at 0600-0700 hr and 1700-1800 hr. A large number of visitors are attracted by the zoo every day as because the zoo is situated on the centre of the Kolkata metro city and have

collection of varieties of rare and endangered animal.

Methodology

We recorded activity patterns and social organization of adult *Blue bull* in captivity at the Zoological Garden, Alipur, Kolkata between 1st July and 31st August 2006. Two observers gathered all data simultaneously. Two observers engaged in recording the data on the various activities of *Blue bull*. For data recording, the activities of each animal were observed 5 minutes in an interval of 10 minutes continuously for 3 hours in each day of observation. Observation was conducting in three sessions (morning, noon, afternoon) in a day. Data were collected during the normal operating hours of the zoo, which were generally 0900h to 1800h. Observation hours were equally distributed between dawn and dusk. Activity of both male and female were sampled repeatedly in different hours of the day using focal animal sampling method (Altman, 1974), and at the same time numbers of visitors and social organization of *Blue bull* were counted by scan sampling method (Altman, 1974). The behavioural states recorded were: feeding, walking, resting and social. Resting includes standing, scanning and lying activity of the individual.

The percentage times spent in various activities were calculated by using a formula.

$$\% \text{ Activity} = \frac{\text{Total time spent in particular activity during sample}}{\text{Total sampling time in all activities}} \times 100$$

Data on the activities between male and female were compared by applying T-test and the relationship between activities of Blue bull and Visitor numbers were analyzed using correlation (Zar, 1984).

RESULTS AND DISCUSSION

A total of 180 hours spent in recording the different basic activities of *Blue bull* during the whole study period. The time period during the observation hours, the study animal were moving inside the house are not included in the calculation of results. The results of the study on the time budget and schedule of the activities in day time are presented below.

A. Time Activity Budget

The percentage time spent in various basic activities by the male and female individuals of *Blue bull* is given in table 1. It was found that, male spent about half of the day time in feeding (45.83%), followed by resting (31.39%) and rest of time engaged in other activities including walking and social activities. Similarly, female spent 45% of their day time in feeding, 27.87% of day time in resting and the rest of their day time in walking and social activities. No significant difference found in time spent in basic activities between the male and female individual. The analysis also reveals that, no significant difference in each bout of the feeding activities (Male = 55 second, Female = 54 second) and resting (male=37.6 sec., female=33.4 sec) activity in between the male and female. The average time spent in each bout of the social activities by male was 10.2 second and female was 11.4 second. The frequencies of urination-defecation, grooming and playing by head to head pushing were recorded many times under social activities whereas no records of fighting activity were found during the observation period.

As the feeding activity in both male (45.83%) and females (45%) were more in the afternoon and the time spent and frequency of feeding was more or less similar, we may conclude that both the male and females shows similar feeding pattern.

Resting: The peak hours of standing were 11-12 am, and 16-17 pm in case of male (Figure 1) while in female the peak hours were 10-11 am, 13-14 pm and 17-18 pm (Figure 2). The activity pattern of standing in male and female is different. The male was more active than female. The peak hours of lying were 11-12 am, 13-14 pm, 15-16 pm, in case of female while in male the peak hours of lying were 10-11 am, 14-15 pm, and 16-17 pm. It was found that the lying activity of male and female was less during the afternoon hours.

Walking: The peak hours of walking were 11-12 am, 13-14 pm, and 15-16 pm in case of female while in male the peak hours were 10-11 am, 14-15 pm, and 16-17 pm. (Figure 1 & 2). It is found that the walking activity pattern was maximum during the afternoon hours in both male and female but the female seems to be more active than the male.

Social: The other activities, which the animal does include scanning, excretion, comfortable behaviors, threatening and ruminating activities. There are no specific pattern were observed on sexual activity. The percentage duration spent in scanning, rubbing, ruminating is slightly more in case of female than male. However, both the male and female spent similar time in comfortable behavior include grooming, and scratching.

Table 1. Mean and standard error (SE) of the time spent (percentage) in basic activities of *Blue bull* in Zoological Garden, Alipur, Kolkata, July-August 2006. (N=180 hour).

Activity	Male (Mean \pm SE)	Female (Mean \pm SE)
Feeding	45.83 \pm 1.55	45 \pm 1.41
Walking	14.26 \pm 1.19	17.59 \pm 1.51
Resting	31.39 \pm 1.33	27.87 \pm 2.02
Social	8.52 \pm 1.07	9.54 \pm 0.86

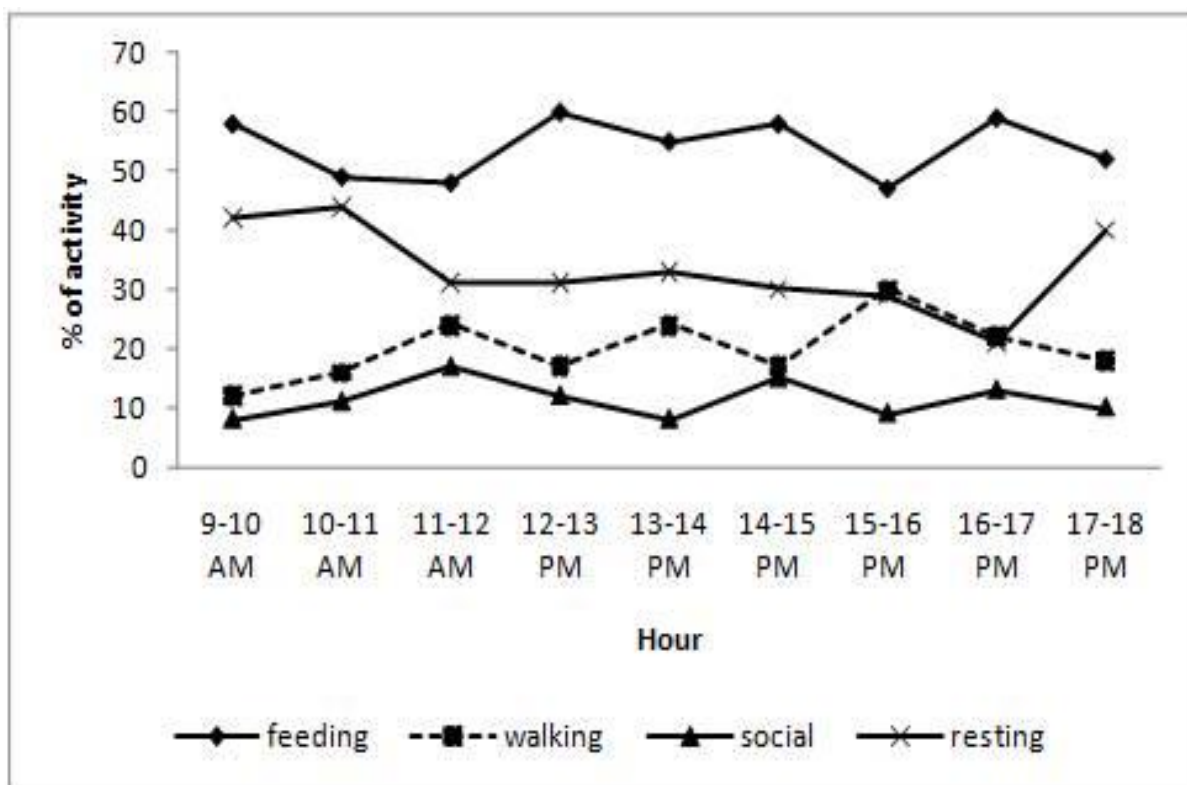


Figure 1. Diurnal activity pattern of *Boselaphus tragocamelus* (female) in Zoological garden, Alipur, Kolkata, July-August 2006.

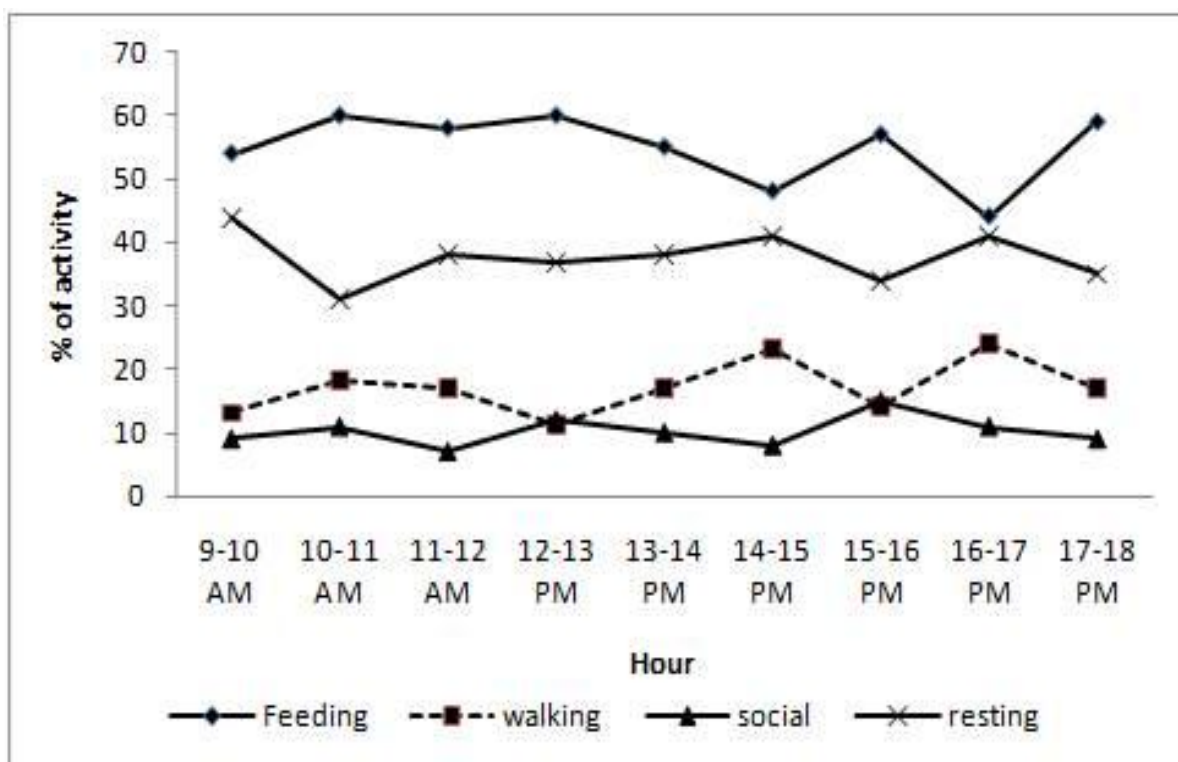


Figure 2. Diurnal activity pattern of *Boselaphus tragocamelus* (male) at Zoological garden, Alipur, Kolkata, July-August 2006.

CONCLUSIONS

In conclusion, the basic activities like feeding, resting are fluctuating between different hours of day. The peak hours of feeding were morning and evening while the peak hour of resting was noon. The activity pattern of Blue bull was also influenced or dependents on the visitor presence. During the rush hours of visitor, most of the time spent by Blue bull in scanning (calculated under standing activity). This indicates that visitor presence is also one of the factors which regulate basic activities of this animal in captivity.

CONFLICTS OF INTEREST

The authors declare that there are no conflicts of interest associated with this article.

ACKNOWLEDGEMENTS

We express our thanks to the Director of the Zoological Survey of India, for giving the permission and providing all the necessary facilities for the project. We are grateful to Dr. S. Chowdhury, Director, Zoological Garden, Kolkata who gave the permission to study on Blue bull and his co-operation to carry out the project smoothly. Thanks also to Dr. S. S. Panigrahi, Head of the Dept. of Zoology, Vidyasagar College, Kolkata for his valuable suggestion on the project.

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