

Investigation in activity time budget and Social Organization of Indian Black Buck (*Antilope cervicapra*) Linn. (Mammalia Artodactyla) at M.C. Zoological Park, Chhatbir (Pb.) (India)

R. VATS¹ and C.S. BHARDWAJ

¹Academic Counsellor IGNOU and Assistant Project Coordinator, SSA, Ambala (India).
Department of Zoology, Dayal Singh College, Karnal (India).

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ABSTRACT

Indian Black Buck (*Antilope cervicapra*) Linn. is a state animal of Haryana and Punjab. The present study has been conducted at M.C Zoological park, Chhatbir (Pb). The present study revealed that black buck is early riser and temperature and sunlight affects in activities and social organisation. Females found in herds and herds of males never seen.

Key Words: *Antilope cervicapra*, activity time budget, social organisation.

INTRODUCTION

Indian Black Buck (*Antilope cervicapra*) Linn. is a state animal of Haryana and Punjab. Its presence indicates the health of an ecosystem as it is an important part of grazing food chain. Due to increased urbanization and ever increasing human population, there is found a great pressure on the population of black buck. It is protected in natural conditions in different deer parks in the states of Haryana and Punjab. The deer park of Mahendra Chaudhary Zoological park, Chhatbir (Pb.) is one of that. To understand the basic ecology and behaviour of Indian Black Buck it was pertinent to study the activity time budget and social organization.

The Zoological Park is located at Chhatbir Reserve Forest about 19 km from Chandigarh and 23 km from Rajpura on Chandigarh Patiala Highway. 2.02 hectares of reserve Forest along the right bank

of the river Ghaggar which has young to middle aged semi natural forest. This park was established in 1974 in Chhatbir District Patiala by Sh Mahendra Chaudhary, The Hon'ble Governor of Punjab at that time and was opened for public on 13th April 1977. It is the biggest zoological park in North Western India.

Methodology

The observation of daily routine were recorded from 6:00 a.m. to 7:00 p.m. time of early morning arrival, peak of grazing and departure for rest in forenoon schedule was noted down. Total hours spent in grazing and other activities were calculated and recorded accordingly. During noon the resting hours were noted down. In the afternoon, time of arrival for grazing, peak of grazing, rest till the evening and varied activities in evening were also observed. Total hours spent in grazing in afternoon, in walking, standing and other activities were calculated. Time spent by males and females

in grazing, walking, lying and standing on monthly basis was recorded.

Observations were made at all the four sides of the deer safari to study the social organization among the animals. As soon as a certain herd came in the preview of eyes, it was observed until it disappeared. The number of individuals in herd and composition of sex and age with reference to adult males, sub-adult males, adolescent males, old females, pregnant females, adult females and fawns were recorded. During the course of continuous observations, the numbers of animals that joined and left the herd were recorded. In order to find out average number of males and females in single herd, weekly observations have been taken into account.

RESULTS AND DISCUSSION

During summer animals arose at about 5:15 a.m., whereas the animals came out in the open in winter at 6:00 to 6:15 a.m. After walking for a while, animals used to graze. The grazing picked up at around 8:00 a.m. in winter and at 7:30 to 7:45 a.m. in summer. The grazing reached the maximum point at 8:45 to 9:30 a.m. in extreme winter and 8:15 to 8:30 a.m. in summer. There were periods of rest between 11:00 a.m. to 2 p.m. hours during all the season. Then the next grazing and other activity peak came at 3:15 p.m. to 4:15 p.m. There was a period of rest between 4:30 p.m. to 5:30 p.m. varying during different seasons as shown in table 1. The animals were seen doing other activities after that period of rest up to 7:00 to 7:30 p.m. according to season.

The females devoted 2:30 to 3:00 hours in grazing daily. The females devoted more time to walking i.e. 4:45 to 5:30 hours daily. The frequencies of occurrence of grazing, walking, lying and standing are 20.83%, 35.45%, 20.25% and 23.49% respectively in females. It is clear from the table-1 that males devoted maximum time in walking i.e. from 3:45 to 4:30 hours daily followed by 2:45 to 4:00 hours daily in grazing. The males passed slightly less time in standing and least time in lying. The frequencies of occurrence regarding grazing, walking, lying and standing are 24.74%, 30%, 20.70%, 24.51 % respectively in males. The time

passed by animals in fighting, drinking and other activities was too short lined to be noted.

Total animals which came into sight during the period of one year as a result of weekly visit are 4100. Total incident of observation throughout one year of study were 48. Table 2 shows average number of individuals per herd recorded at monthly intervals during the study period October 2006 to September 2007. Maximum size of herd i.e. 25 was observed in the month of January and minimum size i.e. 10 was observed in October. Average herd size was biggest in December and January i.e. 25 and smallest in October and March i.e. 10 or 12. The herd sizes begin to swell from early December as in table 4.2. It was observed that the decline of winter herd size also reduced. There were seen smaller herds during October and March as against normal size during rest of the months. During breeding period in October and March smaller herd consisting of two or three males and six to seven females were seen. As far as composition of herd is concerned, three categories of social grouping were observed i) Mixed herd, ii) All female herd, iii) lone territorial male.

As far as percentage wise occurrence of various categories of males, females and fawns is concerned. It is clear from histogram No. 4.3 that maximum number was contributed by adult female (43%) followed by adult male (16.75%), sub-adult female (14%), fawns (11 %), sub-adult male (8.5%) and territorial male (6.5%).

The mixed herd was observed throughout the year. In mixed herd maximum number was contributed by females ranging from 6 to 22. Besides, females' 2 to 3 fawns along with 2 to 6 males were present in mixed herd. All female herds were seen round the year. These were more frequently observed during November to January and then their number goes on increasing from April. The old male always seen living alone during the study period and never given company by any female, male or fawn. All male herds were never observed.

It is evident from the table-1 that black buck rises up early and come into ground at around 5:30 a.m. in middle of October. The arrival in the open is

Table 1: Diurnal time budget of black buck at M.C. Zoological park chhtabir (PB)

Date of Visit	Forenoon Schedule					Resting Period in Noon					Afternoon Schedule				
	Early Morning arrival	Time of peak grazing	Time of departure of rest	Total hours of grazing	Total hours of standing walking & other activities	Rest period	Total time spent in rest	Afternoon arrival	Time of peak grazing	Time of rest in evening	Time of fo activities in evening	Total hours of grazing	Total hours of other activities		
1	2	3	4	5	6	7	8	9	10	11	12	13	14		
4.10.06	5.30am	8.35-9.30am	11.30am	2.15	3.45	11.30-2.00pm	2.30	2.00pm	3.40-4.30pm	5.00-5.40pm	5.30-7.30pm	1.00	4.30		
18.10.06	5.30am	8.35-9.30am	11.30am	2.15	3.45	11.30-2.00pm	2.30	2.00pm	3.40-4.30pm	5.00-5.40pm	5.30-7.30pm	1.00	4.30		
2.11.06	5.40am	8.35-9.30am	11.45am	2.00	4.05	11.45-2.00pm	2.15	2.00pm	3.40-4.30pm	5.00-5.40pm	5.30-7.30pm	1.00	4.30		
20.11.06	5.30am	8.35-9.30am	11.30am	2.15	3.45	11.45-2.00pm	2.30	2.00pm	3.30-4.30pm	5.00-5.40pm	5.30-7.30pm	1.00	4.30		
4.12.06	5.30am	8.45-9.45am	11.45am	1.30	4.15	11.45-2.00pm	2.00	1.45pm	3.15-3.45pm	5.00-5.30pm	7.00pm	1.15	4.30		
18.12.06	6.05am	8.45-9.45am	11.45am	1.30	4.10	11.45-1.30pm	1.45	1.30pm	3.55-4.50pm	4.50-5.30pm	7.00pm	1.15	4.15		
2.01.07	6.10am	8.35-9.30am	11.50am	1.30	4.10	11.50-1.30pm	2.30	2.00pm	3.40-4.30pm	5.00-5.30pm	7.00pm	1.00	4.30		
15.01.07	6.15am	8.45-9.45am	12.00noon	1.45	4.00	12.00-1.45pm	1.40	1.40pm	3.15-3.45pm	4.50-5.15pm	7.30pm	1.05	4.15		
29.01.07	6.20am	8.45-9.45am	12.00noon	2.00	3.50	12.00-1.45pm	2.00	2.00pm	3.15-3.45pm	4.50-5.15pm	7.00pm	1.05	4.15		
12.02.07	6.10am	8.45-9.45am	12.00noon	2.00	3.50	12.00-1.45pm	2.00	2.00pm	3.15-3.45pm	4.50-5.15pm	9.45am	1.00	4.00		
25.02.07	6.10am	8.45-9.45am	12.00noon	2.15	3.50	12.00-1.45pm	2.30	2.00pm	3.15-3.45pm	4.50-5.15pm	7.00pm	1.00	4.00		

Table 1. Cont.

06.03.07	6.00am	8.45-9.45am	12.00noon	2.00	2.00pm	3.15-3.45pm	4.50-5.15pm	5.15-7.00pm	1.15	4.00
27.03.07	6.00am	8.45-9.45am	11.40am	2.30	2.00pm	3.15-3.45pm	4.50-5.15pm	5.30-7.15pm	1.15	4.00
25.04.07	5.35am	8.30-9.30am	11.30am	2.15	1.45pm	3.15-4.00pm	4.30-5.30pm	5.45-7.30pm	1.00	4.15
16.05.07	5.35am	8.30-9.30am	11.30am	2.15	1.45pm	3.15-4.00pm	4.15-5.45pm	5.30-7.15pm	1.15	4.15
30.05.07	5.20am	8.15-9.15am	11.30am	2.30	2.00pm	3.30-4.00pm	4.15-5.45pm	5.45-7.30pm	1.00	4.30
13.06.07	5.15am	8.15-9.15am	11.00am	2.45	2.00pm	3.45-4.00pm	4.15-5.45pm	5.45-7.00pm	1.30	4.00
27.06.07	5.15am	8.15-9.15am	11.00am	2.45	2.00pm	3.45-4.00pm	4.15-5.45pm	5.45-7.00pm	1.30	4.00
17.07.07	5.15am	8.15-9.15am	11.00am	2.45	2.00pm	3.45-4.00pm	4.15-5.45pm	5.45-7.00pm	1.30	4.00
31.07.07	5.20am	8.15-9.15am	11.00am	3.00	2.00pm	3.45-4.00pm	4.15-5.45pm	5.45-7.00pm	1.30	4.00
17.08.07	5.00am	8.30-9.30am	11.00am	2.30	2.00pm	4.00-4.30pm	5.00-5.30pm	5.30-7.30pm	1.00	4.30
31.08.07	5.20pm	8.15-9.30am	11.15am	2.40	2.15pm	4.00-4.15pm	4.55-5.30pm	5.30-7.30pm	1.00	4.00
13.09.07	5.20pm	8.15-9.30am	11.15am	2.40	2.15pm	4.00-4.15pm	4.55-5.30pm	5.30-7.30pm	1.00	4.15
27.9.07	5.20pm	8.15-9.30am	11.15am	2.40	2.15pm	4.00-4.15pm	4.55-5.30pm	5.30-7.30pm	1.00	4.15

delayed gradually in November, December and January. The much delayed arrival in the morning (6:20 a.m.) is in the end of January. Perhaps this continuous late arrival is correlated with the gradual late sun rise during these months or gradually falls in the temperature. The temperature during these months goes on decreasing, so may be this delayed arrival may have some relationship with the temp trend.

On the other hand their arrival in open advanced gradually from February onward till June. Before it is evident that early sun rise during this period is having some effect on early black buck arrival in open for activities. It is also clear that during this period temperature also goes on increasing. Therefore, it may be said that temperature and sunrise ultimately stimulate the arrival of black buck in open. The peak grazing time ranges from 8: 15 to 9:30 a.m. on an average intense grazing takes place as per an hour as shown in table-1. This is an agreement with the finding of Neir (1976) who has found peak grazing time on 9:00 to 9:30 a.m. However Mungall (1978) reported grazing immediately after rising up in the morning. Another feature of time of peak of grazing during winter when temperature is low. It has been delayed up to 9:45 a.m. It is also clear from the table-1 that total hours of grazing in forenoon grazing time are nearly over two hours where minimum is 1:30 hours (4.12.2006)

and maximum 3:00 hours (24-10-2007, 31-7-2007). It is evident from table-1 that on average first time of rest during noon is of 2: 15 hours. Maximum resting period is 3: 15 hours and minimum is as less as 1:40 hours. The resting period during noon is much more in summer than in winter. The maximum resting period is in the months of June and July and minimum during December. In summer months due to full noon the animals prefer to nest during agreement with Prasad (1985). As far as the second session of grazing is concerned, it generally increases in the afternoon. It may be as early as 1:30 p.m. (11.12.06) and may be delayed up to 2: 15 p.m. during early October and early November. Time of peak of grazing in afternoon is generally around 3:00 to 4:00 p.m. at its earliest 3: 15 p.m. and latest 4:30 p.m. The black buck retires for second nest in the evening at 5:00 p.m., earliest being 4: 15 p.m. and latest 5:00 p.m. Time devoted to nest during summer months is more than during winter months. The late evening activities were observed up to 7:30 p.m. during June, July and August and up to 7:00 p.m. in December, January and February. This is due to early sun set during winter months and late sun set during summer months.

The total hours spent in grazing in the afternoon are nearly constant over one hour. The maximum period spent is 1:30 hours during June

**Table 2: Average number of individuals per herDat
Monthly intervals October 2006-September 2007**

Average No. of Individuals seen in Each Month				
Date of Visit	Male	Female	Total	Average
18-10-2006	4	11	15	13
20-11-2006	4	15	19	16
18-12-2006	7	13	20	20
15-01-2007	8	17	25	25
19-2-2007	6	13	19	23
27-3-2007	4	8	12	13
25-4-2007	4	9	13	15
23-5-2007	4	8	12	14
20-6-2007	4	7	11	12
17-7-2007	4	7	11	11
15-8-2007	4	7	11	12
12-9-2007	2	5	7	8

and July and minimum 1:00 hours during the winter months. The male spent their maximum time in walking followed by grazing, standing and lying. The females spent maximum time in walking followed by standing, grazing and lying. The male spent more time in grazing than females that may be due to the higher needs of food of males. The female spent more time in walking than males. The cause of this may be that female is more timid than males. They ran away when found a human viewing of them but male remain stand still as also noted by Chandershaker (1987).

A tendency exists among animals to band together in flocks, herd or loose colonies. In all social system in general; two opposing forces operate simultaneously; mutual attraction versus social intolerance to establish social dominance, the former contributing to herding while latter against crowding. The combinations of terrain and vegetation profile have a pronounced effect upon herd size and composition among black buck (Mungall *et. al.* 1981).

The maximum herd size i.e. 25 (table-2) is observed in late January and till middle of February. It is also clear from the table that size of herd begin to smell from early December. It is also evident that

the new year progress towards March, the herd size starts declining. It seems that big herd size come into being during onset of winter season and go on increasing gradually as the temperature comes down during December and January.

The herd size was biggest in December and January (i.e. 25) and minimum is October i.e. 11. It is to be noted that minimum number of herd size has been sighted in September and not in June. Perhaps minimum number in October during the breeding season. March shows higher number of herd size correlated with low temperature during that month of the present study. Turning to changes in herd composition seasonally. It is clear that mixed herd is most common. A large number of pseudoherds were observed during the winter season as compared to others seasons. All females' herds were seen in abundance during the peak of summer and peak of winter. In mixed herd, the male which was most strong was always found at the rear end of the herd. The herd of all males was never observed (Chander Shekhar (1987).

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