STUDIES ON ECOLOGICAL ASPECTS OF NILGAI, (BOSELAPHUS TRAGOCAMELUS) IN SHEKHAWATI REGION OF INDIAN THAR DESERT

RAKESH GAUTAM, PRASHANT BISSA

Abstract: The present paper deals with observations of the study conducted on Nilgai in Shekhawati Region in Indian Thar Desert during 2012 and 2013. Blue-Bull is a horse like animal and show clear sexual dimorphism. The Nilgai is the biggest Asian antelope. Length of horns, which are carried only males, was 15-24 cm. Reported largest weight of 288 kg for males and 212 kg for females. The major crop damage on crops of 'Rabi' and 'Kharif' was caused not only by feedings but also due to trampling during movements, resting and fighting between two male at the time of breeding. They use water and flooder of domestic animals. Activity pattern has been observed from sunrise to sunset and compared for each of the three seasons. The morning activities comprised chiefly restricted movement of individual for feeding, grooming, drinking, urination, defecation, tail movement and herd movement etc. In the season of summer the movement of Nilgai is greater than winter due to insufficient food and water. For the searching of water and fodder, Blue-Bull traverses the entire home range. Nilgai is strictly vegetarian and is a well known herbivore. It is primarily grazer and also observed as feeder. The dung is a reliable indicator of animal presence and has been used in Indian subcontinent to quantify the habitat use.

Keywords: Crop pest, Ecology, Indian Thar Desert, Nilgai, Shekhawati region.

Introduction: Nilgai are member of the family Bovidae and are the only species of *Boselaphus* [5]. They are closely related to the 4-horned antelope (*Tetracerus quadricornis*), African eland (*Taurotragus oryx*) and cattle (*Boss spp*.). The Nilgai is the biggest Asian antelope [11]. The Indian name "Nilgai" can be translated to mean blue (nil) bull (gai). "Gai" is feminine gender, but is used to connote either sex of the species as one of a variety of cattle [10]. Both Indian and English prefixes of the name refer to the blue-gray color of adult males. Females and all juveniles are light brown in color. Blue-Bull is a horse like animal and show clear sexual dimorphism. Nilgai, is a common antelope found in open scrub /forests where little vegetation exists and in and around wildlife sanctuaries in Rajasthan but avoid dense forest [13]. Nilgai raids on cultivated crop because shrubs and trees found in this area do not provide sufficient food. It is observed that when food availability is insufficient they easily jump 6-8 feet barbed fencing, stone wall, fencing with high soil and thorny plants as well as passes under the fencing.

Study Area and Methods:

Study Area: The Shekhawati region of Indian Thar desert, located in the north-east part of Rajasthan lies in between 27°24′ to 29° 02′ N latitude and 73°4′ to 76° 5′ E longitude at a height of about 320 meters from sea level. The region covers an area of 27,529.44 sq km.

Shekhawati region comes under the principal arid zone of the Indian Thar desert. Rainfall in this region is highly erratic. Besides during short period of monsoon, the humidity is generally above 60% but in summer season it decreases below 30% due to dryness in environment. Due to desertic conditions, the temperature of this region is extremely hot. In summer season the maximum temperature may reach up to 50°C and in winter season the temperature may fall as low as -2.0°C.

Methods: The Nilgai groups were observed by scan sampling method as described by [1]. Food habits of Nilgai are often recorded by observing the plants eaten as the animal graze or noting the location where animals grazed and inspecting the site to see what plants were eaten [19].

Ecological Aspects:

Morphology of Nilgai: Male (bull) and female (cow) stand 1.2- 1.5 meters and 1.0-1.3 meter at the shoulder, respectively. Body is usually 1.8-2.3 meters long for males and 1.8 meter for females. They have a small triangular tail with 40-53 cm in length, which moves a very high frequency when they are excited. The female are more brownish colored. The forelegs are somewhat longer than the hind legs, and the head is long and pointed. However, young bulls are light brown. There are two white bands above the hoof. The white spots are present on each side of cheek.

Reported largest weight of 288 kg for males and 212 kg for females [18]. Although in the both sexes the neck is ornamented with the mane, only the bulls develop a tuft of hair on the throat and have an erectile mane on the back of the neck, which is thin, dark and dense. The hair of adult cow is thin, particularly on the neck and shoulders of bulls. The upper parts of males are generally iron gray or sluttish black-gray, but the lower surface of the tail,

stripes inside the ear, rings on the fetlocks, and the under parts are white.

Their ears are white inside with paired horizontal black stripes in grooves between dermal ridges. Three white vibrissae spots mark each side of the head; one in each fore-brow and two on each lower jaw. A white band originates between the forelegs and extends posteriorly along the ventral median to about the umbilical scar. There, the bands expand to cover the lower abdomen and inside of the back legs to a point above the hocks. Nilgai have a narrow white rump patch bordered by erect fringe hair, which is black-tipped and 45-60 cm long. White patches occur entirely on the hocks and inside the upper forelegs. The head and limbs are tawny, and the throat tuft and tip of the tail are black. Length of horns, which are carried only males, was 15-24 cm. The cone like horns are triangular at the base and circular pointed towards the tip [12].

Food and Feeding Habits: The data on food and feeding habits of Nilgai are based on direct observations in the crop field. Nilgai is strictly vegetarian and is a well known herbivore. It is primarily grazer and also observed as feeder. The plant or plant matter consumed by the animals were classified into four categories' viz. grass species, tree species (leaves, flowers, fruits, pods), forbs (dry shed leaves and pods falling on ground) and agricultural crops. The herds of blue bull have been observed shifting from one area to another, depending upon the availability of crops [6], [16].

The consumption of grasses was highest, followed by leaves and pods, and least in winter. In agricultural fields, crops were consumed more in winter and in monsoon, when this food was available in plenty. Nilgai appear in better body condition in late winter than summer, when high quality crops were in abundant supply. Hence crops were preferred to other plant in the area. Dinerstein (1979) mentioned that during the rains and early winter, when forage conditions were favorable, the Nilgai also fed on a verity of browse plants. Being large in size, more browse was easily accessible to the Nilgai and it frequently browsed on trees. Haque (1990) has also described the highest protein content in winter crops than the plants of semi-arid regions.

Available food elements in the region are *Prosopis cineraria* (Khejri), *Azardirachta indica* (Neem), *Ficus religiosa* (Peepal), *Dalbergia sisso* (Seesam), *Acacia nilotica* (Desi Babul), *Salvadora persica* (Mitha Jal), *Albizzia lebbek* (Sares), *Prosopis juliflora* (Vilayti Babul), *Acacia senegal* (Kumbat), *Maytenus emarginatus* (Bekal), *Capparis decidua* (khair), *Accacia jacquemontii* (Baonli), *Calotropis procera* (Akda), *Ziziphus mauritiana* (Ber), *Ziziphus nummulariaI* (Jharberi), *Mimosa hamata* (Jhinjhini), *Euphorbia nivulia* (Thor) and *Balanites aegyptiacus* (Hingota). In more sandy areas *Calligonum polygonides* (Phog), *Crotolaria burhia* (Senia), *Leptadenia pyrotechnica* (Khimp) are common.

Cultivated crops and vegetables are used by Nilgai. The major crop damage on crops of 'Rabi' and 'Kharif' was caused not only by feedings but also due to trampling during movements, resting and fighting between two male at the time of breeding. Nilgai is regarded as a serious mammalian crop pest due to eating less but destroying more by trampling and cause crop damage [7].

Use of Water: In Desert Nilgai require water, so mostly herd of Nilgai presents near the farming lands, as well as natural water sources. It is observed in the study area that herds of Blue-Bull found around the corrals of domestic animals. They use water and fodder of domestic animals. In Sheksawati area surface water is less that influences the distribution if animals. The study suggests that the requirement of Nilgai for drinking water coincide with the atmospheric temperature and amount of succulent forage they received. According to Prater (1971) Nilgai can go for long period without water, and even during the hot weather, Nilgai do not drink water regularly. Hadlend (1978) and Sheffield et al., (1983) stated that lack of available surface water during a dry period caused permanent shift in the home range of an adult male.

Daily Activity Pattern: Activity pattern of Nilgai was studies in crop fields during study period. Normally the Blue-Bull becomes active well before dawn and starts it's moving activities in the vicinity of night resting places. The morning activities comprised chiefly restricted movement of individual for feeding, grooming, drinking, urination, defecation, basking in the sun, tail movement, tongue movement and herd movement etc.

First of all herd may go to drink of water. On their way, if food either grazing or browsing is available may stop here and there to graze or browse. Activity pattern has been observed from sunrise to sunset and compared for each of the three seasons. Standing, feeding, resting, moving and other parameters covered in study.

Use of Habitat: The observation suggests that the movement of all male herds is larger than bisexual herd because of greater metabolic demand on female [8]. The Nilgai antelope display high rates of daily movements in the study area. The decreases movement of Blue-Bull in crop lands is observed during rainy season. After the onset of monsoon the fairly abundant vegetation in field is adequate to meet their nutritional needs and Blue-Bull probably can survive on small natural plant material. In the season of summer the movement of Nilgai is greater

than winter due to insufficient food and water. For the searching of water and fodder, Blue-Bull traverses the entire home range. Bisexual herd do not move too far, rather than all male herd. The wide migratory range of Nilgai is due to searching of water and fodder. But coincidently the rutting season of Nilgai is winter; males pursue the females during this season. This also causes animal to move up and down in their habitat and hence their higher mobility in winter.

Fecal Piles: Nilgai have a characteristic habit of defecating repeatedly in the same location, resulting in the location of large fecal piles or lavatory sites of nearly a meter in a diameter [3], [15]. Schaller (1967) suggest that these piles might function as territorial markers, since the behavior is characteristic of several species of African antelope.

The findings are same with Sankar (1994) and Sheffield (1983) that bulls undoubtly use lavatory sites, more often than cows and calves. According to Berwick (1974) dung is a reliable indicator of animal presence and has been used in Indian subcontinent to quantify the habitat use.

References:

1. Altman, J. Observational study of behaviour: Sampling methods. Behaviour, 1974. 49:227-267.
2. Berwick, S. H. The community of wild ruminants in the Gir Forest ecosystem, India. Ph.D. Dissertation, Yale University, New Haven, 1974. 266 pp.
3. Brander, A. A. D. Wild animals in central India. Edward Arnold and Company, London, United Kingdom, 1923.
4. Dinerstein, E. An ecological survey of the Royal Karnali-Bardia Wildlife Reserve, Nepal.Part II. Habitat/animal interactions. Biological Conservation, 1979. 18:265–300.
5. Fall, B. A. On social organization and behavior of nilgai antelope, *Boselaphus tragocamelus* (Pallas), in south Texas. M.S. thesis, Texas A&M University, College Station, 1972.
6. Goyal, S.K. & Rajpurohit, L.S. Ecobehavioural Study of Nilgai, *Boselaphus tragocamelus* At Beriganga near Jodhpur (RAJASTHAN). Cheetal - vol 37, 1998. pp 36-39.
7. Goyal, S.K. And Rajpurohit L.S., Population dynamics and range use by Nilgai blue bull (*Boselaphus tragocamelus pallas*) in western Rajasthan. Ph. D Thesis, JNV University, Jodhpur, 1999.
8. Goyal, S.K. and Rajpurohit L.S., Range use by Nilgai (*Boselaphus tragocamelus*) observed during 1997-99 in three sites of Jodhpur District, Rajasthan (India). Oikoassay, 2000. vol.14 No. 1&2, 1997/5 (Issued December, 2000).
9. Hadland, C. M.Home range, movements and activity patterns of Nilgai antelope in South Texas. Draft M. S. Thesis. Texas A & M Univ. Agric. Exp. Stn., College Sattion, 1978. 79 pp.
10. Haque, N. Study on the ecology of wild ungulates of Keolodev National Park Bharatpur, Rajasthan. Ph. D Thesis. Centre of Wildlife and Ornithology. AM University, Aligarh 1990. 308 pp.
11. John, M. E. and J. Barnabas. Gene diversity of bovid hemoglobin. Biochemical Genetics, 1978. 16:787–798.
12. Prater, S.H. The Book of Indian Animals. Bombay Natural History Society, Bombay, 1971.
13. Roonwal, M.L., In: Fauna of the Great Indian Desert; Alam Singh (Editor), Desert Resources and Technology, Scientific Publisher, Jodhpur, 1983. vol.1: 1-86.
14. Sankar, K. The Ecology of three large sympatric herbivores (chital, sambar, nilgai) with special reference to reserve management in Sariska Tiger Reserve, Rajasthan. Ph.D. Thesis. Univ. of Rajasthan, Jaipur, 1994.
15. Schaller, G. B. The deer and the tiger: a study of wildlife in India. University of Chicago Press, Chicago, Illinois, 1967.
16. Sharma, I. K. Ecological aspects of habitat preferences, feeding, daily activities and niche of the nilgai (*Boselaphus tragocamelus*). Tiger paper, 1981. 8:21 22.
17. Sheffield, W. J. Food habits of nilgai antelope in Texas. Journal of Range Management, 1983. 36:316–322.
18. Sheffield, W. J., B. A. Fall, and B. A. Brown. The nilgai antelope in Texas. The Caser Kleberg Studies in Natural Resources, Texas A&M University, College Station, 1983.
19. Wallmo, O.C., R.B. Gill, L.H. Carpenter and D.W. Reichert. Accuracy of field estimates of deer food habits. J. Wildl. Manage, 1973. 37: 556-562.

Rakesh Gautam/ Research Scholar (Ph.D)/ Department of Zoology/
Basic PG College/Bikaner/gautamrakesh1983@gmail.com;
Prashant Bissa / Principal & Head/ Department of Zoology/
Basic PG College/Bikaner bissa.prashant@gmail.com