

Behavioural biology and ecology of Blackbuck (*Antelope cervicapra*) : A Review

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ABSTRACT

Blackbuck (*Antelope cervicapra*) belongs to the Bovidae family and subfamily Antilopinae and is distributed in India, Pakistan, Nepal and United Arab Emirates. It can live in wide variety of habitats, including grassland, bush land, scrubland and dry thorn habitats. Sexual dimorphism is very clear. Males have blackish or dark brown coat colours, while females have a yellowish coat colour. Males have a shorter lifespan as compared to females. Generally, blackbuck forage in the daytime but sometimes also forage at night and their foraging activity patterns are influenced by environmental factors and seasonal variations. They use to prefer wide variety of food materials, like leaves, grasses, cereals, vegetables, shrubs and varieties of crops. During the breeding season, males become territorial. Herd size is also affected by the seasons and environmental factors. Exotic species invasion, habitat loss, anthropogenic activity, overgrazing and agricultural expansion, urbanization and industrialization all reduce suitable habitat for blackbuck survival. Illegal hunting, poaching, habitat loss, road killing and lack of genetic variation are also responsible for the dramatic decline in the population of blackbuck. Study of genetic variation, captive breeding and the establishment of a blackbuck rescue centre might be helpful for enhancing the population and survival of blackbucks.

Figure : 00

References : 78

Table : 00

KEY WORDS : Blackbuck, Distribution, Food, Habitat, Habitat loss, Hunting, Population

Introduction

Blackbuck *Antelope cervicapra* is a beautiful gazelle-like antelope that belongs to the 'Bovidae' family and subfamily Antilopinae (true antelope). Blackbuck (*Antelope cervicapra*) is distributed in India, Pakistan and Nepal with some individuals found in the United Arab Emirates^{44, 46}. They prefer open grassland, bush land, scrub land and dry thorn habitats and blackbuck plays a crucial and significant role in the grassland ecosystem^{42, 70}. Several studies have been conducted on the behavioural biology, habitat and ecology of blackbuck in India as well as in Nepal^{2, 15-17, 19-21, 26, 41, 60, 62, 68}. During the 19th century, this species was a common throughout the Indian subcontinent but with time they are on decline in many parts of India due to excessive hunting, habitat loss and expansion of urbanization, agriculture activity and industrialization^{12, 44}. According to the IUCN red list category, blackbuck is currently listed in the least concern (LC) category but earlier it was categorized as near threatened (NT)^{31, 47}. The blackbuck is also listed in appendix III of CITES (Convention on International Trade in Endangered Species of Wild Fauna and Flora) and is considered a Schedule I species with the highest

protection level in India as per the Indian Wildlife Protection Act, 1972.

In this review we described various aspects of blackbuck as ecology, distribution, taxonomic position, subspecies, morphology, social organization, food and feeding behaviour, threats and conservation problems.

Taxonomy and sub species of blackbuck

Antelope cervicapra is a member of the Bovidae family. Blackbuck is commonly known as Krishnamriga or Kalahiran. There are four subspecies of blackbuck¹¹, two of which have been identified²⁵ and may be separated²⁴. *Antelope cervicapra* (South-eastern blackbuck), *Antelope cervicapra rajputanae* (Pakistan and northwest blackbuck), *Antelope cervicapra centralis* (central India) and *Antelope cervicapra rupicapra* (Nepal and North India) are the subspecies of blackbuck¹¹.

External morphology and sexual dimorphism of blackbuck

Among all Asian *Antelopes*, the blackbuck is the most gracious and majestic animal^{69, 77}. Sexual dimorphism is clearly visible in black bucks⁵⁰. The name blackbuck is due to its dark brownish to blackish dark

coat, whereas the female has a tawny or yellowish coat. As species horns become more beautiful as they mature, as does the intensity of their coat colour. The coat colour of blackbucks is initially yellow, but it becomes darker during maturity. The female blackbuck is smaller than male and male has a striking black and white coloration and a massive pair of spiralling horns. A black or dark brown coat with white under parts makes adult males stand out from the rest. On the other hand, females and immature males have a tan or darker brown coat^{11, 72, 73}. Furthermore, males have 79cm long whorled horns, whereas females lack them¹¹. The species average body length is 100-150 cm, with a tail length of 10-17 cm. Shoulder heights range from 60 to 85 cm⁶⁷. Male's weight ranges between 19.5 to 56.7 kilograms, while females weigh between 19 to 33 kilograms¹¹.

Life span of blackbuck

The average lifespan of a blackbuck in captivity is 12 years, with a maximum lifespan of 16 years¹⁰. Male and female individuals have different life spans and female of blackbuck have a longer life span (up to 16 years) as compared to male (up to 12 to 13 years). A mature blackbuck has an average lifespan of nearly eight years⁷.

Distribution and Habitat

They are found in parts of Pakistan, Nepal and the Indian subcontinent^{44, 46}. It is mainly distributed in a wide variety of habitats mainly arid grasslands, scrubland, marshy coastal plains and open woodland habitats⁶⁵. The species thrives in thin forests, grassy plains^{11, 14, 51}, open areas^{33, 75} and semi-desert areas⁴⁵. These blackbucks can be found in many sanctuaries and national parks across the country, but their largest population resides in Visatpura, Gujarat, where the Bishnoi community has been protecting them as sacred creatures for centuries⁶³. For more than half a century, the people of Bhetanoi village and its neighbouring villages have provided similar protection to the blackbuck in Orissa and their successful community protection of this species has placed the area next to Visatpura⁶. The ideal habitat for blackbuck is grassland and forest that abuts agricultural areas^{1, 11}. The most preferred habitat of species is semi-arid grassland, though there is some variation for different seasons³. Grassy areas are preferred by blackbuck during the monsoon, cropland during the summer and winter and bushy areas are the least preferred habitat in all seasons⁵⁵. Blackbuck prefer open, flat to slightly undulating terrain with thorny and dry deciduous forest providing the most suitable habitat. Wastelands, marginal agricultural land and cultivated areas are all easily adaptable. Blackbuck is herbivores that prefer open areas with low-growing grasses to densely forested areas. Blackbuck is primarily a grazer during the monsoon when

succulent grasses are abundant and resorts to browsing when grasses are depleted, forcing a greater reliance on leaf litter, flowers and fruits⁴. Blackbuck is reliant on cereal crops in areas where habitat is deteriorating rapidly⁴³.

Food and feeding habits of blackbuck

Blackbuck is usually a grazer and herds are typically loose and unstable groups ranging in size from ten to several hundred individuals^{34, 54}. Blackbuck forage during the day^{45, 64}, but they also forage at night in some cases^{11, 44}. Its foraging activity is influenced by a variety of factors, including sunrise, temperature, food quality and availability^{48, 50}. During foraging, the size of the group varies depending on the availability of nutrients⁵². Large herds devote more time to foraging than smaller herds^{29, 48}. They are gregarious and prefer to live in groups of single or mixed sexes, ranging in size from fifteen to thousands of individuals and densities range from 0.5 to 3 per hectare^{44, 70}. Grass, cereal crops and forbs are part of their diet and they also browse on bushes⁴⁴. Blackbuck also reported as a crop grazer and primarily eats the young shoots of pulses and cereals, especially millet and sorghum⁹. Blackbuck serves as a grazer and a browser^{30, 34, 45, 57, 64}, but it can also be classified as a mixed feeder when grass is not available in particular areas^{35, 54, 70}. The Blackbuck can forage on cropland and pasture land as well as tropical and subtropical weed land, dry deciduous forest, open plains, river banks and semi-desert habitats. They are mostly sedentary, but in the summer they may travel long distances in search of food and water⁶³. They forage for a long time, choosing succulent grasses and tender shoots of crops and plants to help them maintain their body water balance. Sedges, fall Witch-grasses (*Digitaria cognate*) and Berseem (*Trifolium alexandrinum*) are preferred as grazers, while Mesquite, *Acacia* trees (in the Cholistan Desert) and live Oaks are preferred as browsers⁵⁹. Fresh tender leaves, grass, crops, cereals, vegetables, shrub and tree leaves are diet of blackbucks^{13, 50}. Cereals and pulse crops consume species in the form of young shoots, causing crop damage. Species have eaten fruits, pods and flowers as part of their food⁴⁵. Blackbuck is an important component of the semi-arid grassland food web and food chain¹¹. They also act as a seed dispersal agent of several plant species in particular habitats. The most of seeds dispersed by blackbuck through their digestive system are a defecated seed that falls to the ground and naturally grows⁸.

Social organization and breeding behaviour of blackbuck

The social organization⁵⁴ of blackbuck can be divided into four parts: (A) solitary males (primarily territorial), (B) all-male or bachelor groups made up of

two or more juvenile, sub-adult or adult males, (C) female groups made up of all age groups of females, fawns, juvenile and sub-adult males and (D) mixed groups made up of both sexes' entire age range. The blackbuck's mating system appears to be adaptable and males generally become territorial during breeding season^{54,61,70} and the basic pattern is similar to African *Antelope*²³. Based on the year-round censuses of fawns and male territorial activity, blackbuck usually breeds throughout the year^{7,65,70}. There is no breeding apex in captivity, but breeding is at its peak in the wild from mid-August to mid-October. Mature males developed territorial domains during the day and their herd sizes also varied. Further more, the odour of the pre-orbital gland stained impressions made by blackbucks with visual vestiges of bushes and grasses. They eject chemicals from their faeces and urine to put their social order in jeopardy⁶⁴. The female group size and mating strategy explain licking as a perceptible social spectacle in blackbuck^{27,28}. Blackbucks use their facial scent glands to mark their territory, which is most noticeable during the rut³². Species preorbital and skin glands are said to be important for pheromonal communication, especially during breeding season. During breeding season, blackbuck produces pheromone-carrying proteins in their preorbital glands. These proteins are thought to be important for marking territory and attracting females⁶⁴. The two main types of mating systems observed in blackbuck are resource-based territoriality and lek territoriality⁴⁹. Mating territoriality ranges from solitary, dispersed leks to tightly grouped classical leks. In addition, the sex ratio of adult members varies, with female members having a higher sex ratio. At the age of two or three years, females reach sexual maturity and single calf is usually born after a six-month gestation period. After a month of parturition, females can mate again⁷¹. Throughout the day, children are active and playful. Male juveniles gradually turn black, darkening noticeably after the third year^{7,71,78}.

Herd size in blackbuck

Blackbuck¹⁵ herd sizes vary according to environmental conditions. Their observed average herd size was higher in monsoon due to the availability of food

material. Herd size is also influenced by seasonal variation and foraging patterns²⁷. Herd size⁴⁹ being smaller in the summer as compared to winter and monsoon. The social behaviour of a species takes the form of male and female blackbucks banding together to form a herd, which aids them in defence, foraging and other aspects^{15,30,78}.

Threats and conservation problems for blackbuck survival

The introduction of exotic and non-native species into natural habitats is the second greatest threat to global biodiversity after climate change²². Dogs have been reported to kill blackbucks in the field, with the young and pregnant females being the most vulnerable. Pregnant female blackbucks may give birth to their babies because they are being harassed, which can have a big impact on reproduction³⁹. During the night, blackbuck migrates to the nearest field area, forest and crop field, resulting in a night road accident. Human-wildlife conflict is a major threat to the survival of blackbuck⁵⁸. Humans hunt blackbuck for meat and horns, which are then used in Ayurvedic medicine and skin treatments³⁴. Blackbuck sympathy and interaction with domesticated livestock increases exposure to bovine diseases⁵⁸. The decline in the blackbuck population was mostly caused by humans. People moved into the area and used stray dogs to chase blackbuck⁵. In Blackbuck, dystocia (difficult birth) was observed, with 75% of mothers returning to normal after delivery and 25 % dying after obstetric operations⁶⁶. Fetomaternal imbalance, cervical dilation (ring womb) failure, uterine contortion, uterine inactivity and abnormal postures are all possible causes of dystocia. Increased epinephrine levels may have disrupted the normal birth process by preventing hormone release. This serious issue is also contributing to population decline of blackbuck¹⁸. Hunting, habitat loss, accidents, shrinkage of gene pool, stress are responsible for blackbuck population decline in several regions of various countries^{36,40,56,72,76}. Various conservation practises like captive breeding and hormone-based conservation, artificial insemination and religious affiliation are utilized for conservation and saving of blackbuck in various regions^{37,38,53,68,74}.

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