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RESEARCH ARTICLE

Use of dens by the desert fox in the desertic environment

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Abstract

The study was carried out on the use of dens by the desert fox in the desertic environment at Jajiwal Dhora and Guda Bhakri study sites in Jodhpur district of Rajasthan. Dens played a vital role in protecting desert fox and their pups from adverse environmental conditions. During study period total 104 dens were recorded out of them, 42 were resting dens and 62 were breeding dens. At Jajiwal Dhora study site 72 dens were observed and at Guda Bhakari study site 32 dens were noted. The desert fox used the dens for pup rearing, resting and saving themselves from different climatic factors such as heavy rain, dust storms, warm air and coldness. Desert fox use the den according to the seasonal changes. Northern-facing dens were mainly used during summer, while southern-facing dens were used in winter. The rodents, birds and bushes dominated areas and agricultural fields were mainly preferred by the desert fox for digging the dens. Direct observation, questionnaire and interview methods were used for the investigation.

Keywords: Desert fox, breeding and resting den, den opening, den facing, use of den.

Introduction

Dens save the foxes from predators, extreme temperatures, water loss, and rearing pups (Moehrenschlager et al., 2004; Jaipal, 2013). Foxes use the den for protection, pup rearing and resting (Meia and Weber, 1992). The foxes have several types of dens in their territory but they use only one or two dens for pup rearing. (Nicholson et al., 1985 and Jaipal, 2013). Mainly, the desert foxes used three opening dens in pup-rearing because these dens are very safe for pups and they can easily go out during the danger. Breeding dens were identified by the different characteristics like deepness and number of openings and also recognized by the scats size and pugmarks of adult foxes and their pups (Jaipal, 2013 and Garg et al., 2020).

Female red foxes spent a prolonged period in the reproductive den with their pups for a few weeks (Saunder et al., 1995). The pups of red fox remain near the breeding den for 10-15 weeks (Sargeant, 1972). Foxes use the dens throughout the year for resting or pup rearing in the breeding season (Kilgore, 1969; Meia and Weber, 1992). When disturbed, Foxes changed the den (Home and Jhala, 2010). Kumara and Singh (2012) noted that the numbers of dens are decreasing with the increasing agricultural lands and regular movement of people in the area.

Materials and Methods

The study on the use of dens by the desert fox in the desertic environment was conducted at Jajiwal Dhora and Guda Bhakari study sites in Jodhpur District, Rajasthan from January 2017 to January 2021. Jajiwal Dhora study site had 3 types of patches like sandy area, plane ground and agricultural field while at Guda Bhakari study site we selected plane ground with hillocks, simple plane ground and agricultural field for the study. The climate of this area is very hot and dry with a maximum temperature rise up to 44°C in the summer and in winter it drops minimum around 10°C in December and January. The vegetation of study areas are xerophytic like Ber (*Zizipus* spp.*),* Ker *(Caparis decidua),* Khejari *(Prosopis cineraria),* Jal *(Solvedora spp.),* Desi Babool *(Acacia spp.*), Aak (*Calatropis procera*), Kheep (*Leptadenia pyrotechnica*), Bui *(Aerva javanica*) etc. Wild animals are also good in number in this area like as Chinkara *(Gazella bennettii*), Nilgai (Boselaphus *tragocamelus)*, Gerbils *(Meriones hurrianae)*, Hare (*Lepus spp.*), Porcupine (*Hystrix indica*), Hedgehog (*Paraechinus spp.*), Monitor lizard (*Varanus spp.)* etc. During field work direct observation, questionnaire and interviews of local people and shepherds of this area

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were taken to collect the data. We applied the Nikon Coolpix p900 camera for the photography and binocular to see the activities of desert fox.

Results and Discussion

Den played a very important role in protecting the foxes and their pups from threats and adverse environmental factors. The desert fox used dens for different purposes such as resting, pup rearing and during reproductive period. We observed total 104 dens in both study sites out of them 42 dens were resting and each had depth of less than 4 feet with single opening while 62 dens were breeding dens and it had depth of more than 4 feet with single to multiple openings (Table 1). Breeding dens were used for pup rearing but sometimes foxes used the breeding dens as resting dens. The openings of dens were rounded and slightly oval in the shape. Jaipal (2013) reported that the shape of the opening of the dens of desert fox are triangular and rounded. We saw both breeding and resting dens which were active and inactive types. In Jajiwal Dhora there were 49 (68.05%) active and 23 (31.94%) inactive dens in which 40 were breeding and 32 were resting. However, at Guda Bhakari study site there were 23 (71.87%) active and 9 (28.12%) inactive dens in which 22 dens were breeding and 10 den were resting (Table 1 and Figure 1).

We noted that the numbers of dens were depended on the types of soil and habitat. In the Jajiwal Dhora the numbers of dens were higher (72) because this area is closed to the human settlement (dhanies and village) and the numbers of feral dogs were higher in this area. These are main predator of fox so desert foxes felt fear and they dig their dens to protect themselves and their pups from these dogs. The soil of this habitat is sandy so fox easily digs the den. Similarly, Jaipal (2013) recorded the maximum dens near the dhanies and wire fencing in Desert National Park and noted that the dens save the foxes from predators.

The Guda Bhakari study site had hillocks and the crevices of these hillocks were used as uncollapsed dens and it also protected the desert fox from the predators and other adverse environmental factors. Various workers (Nicholson et al., 1985; Pal, 1992; Garg et al., 2020) also noted the dens in crevices of rocks. Ewer, (1998); Macdonald and Sillero- Zubiri, (2004); Sillero- Zubiri et al. (2004) reported that red fox use the caves and crevices of rocks as a den in the rocky area. The number of bushes fencing (hedge) of farmland was higher in this site. Desert fox took rest in the fencing. This fencing provided shelter to the foxes due to this reason, the number of dens were minimum (32) in this site.

We observed that the abundance of bushes played a vital role in the number of den and population size of desert fox because desert foxes easily obtained fruits as food materials and they hide in the bushes during the threat and saved from predators. Similarly, Niraula et al. (2020) reported the maximum dens in the herbs-dominated area with trees and

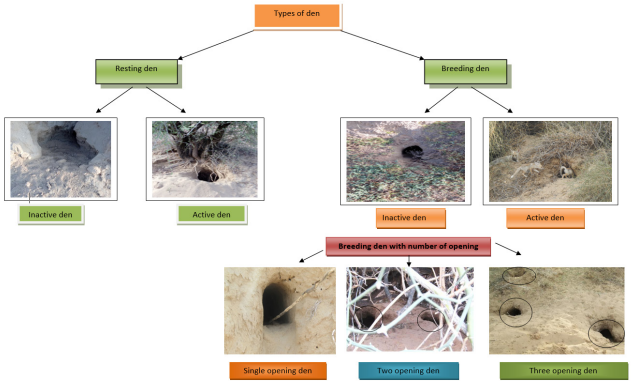

Figure 1: Different type of den

shrubs. We observed maximum dens near gerbil's holes, fruiting plants and agriculture fields because desert fox easily obtained the food materials from these places and highly preferred them for digging the den.

The distance of dens of desert foxes from the roadside, agriculture field and dhanies were depended on the availability of water, food materials, threat and presence of predators. We noted the den of fox 200–300 meter away from the dhanies while it was 300–500 meters away from the road side. In the Guda Bhakari study site, the den of the desert fox was more than 1 km away from the jackal's territory, which was very long. The distance between two dens was 10 feet to 200 meter. Jaipal (2013) recorded that the distance between two dens decreased with increased human activities and predator pressure.

The resting and breeding dens were also studied. Single opening dens were generally used as resting and 2–3 opening dens were generally used as breeding den. Single-opening breeding dens were simple type while 2–3 opening breeding dens were complex and had tunnels (Fig. 1). The breeding dens were mainly used for pup rearing in the month of March to May. It also protects the desert fox from various type of adverse climatic factors like cold air, warm air (loo), dust storm, heavy rain and different predators like dog, jackal etc. During pup rearing period the desert fox used more than one den. In the breeding period desert fox used the old dens of 2–3 openings. These were very safe for pup rearing because fox and pups easily run away during the threats. We observed the dens in the base of bushes because bushes helped to cover the dens and provided a cooling environment in the summer season. Jaipal (2013) noted the similar characteristics of den and observed that the root system of bushes provides mechanical support to dens and protects them from collapse. We noted that the desert fox used the dens according to changing season. They used the northern facing den in the summer while east and south facing dens were used during the winter. Foxes sit in front of sunlight at open places. During monsoon season desert fox rarely used the den and they took rest in the open

Table 1: Breeding and resting dens of desert fox in both study sites

S. No.	Study site	Total number of Dens	Resting den	Breeding den			
					Number of openings		
					Single opening	Two opening	Three opening
1.	Jajiwal Dhora	72	32	40	20	12	8
2.	Guda Bhakari	32	10	22	8	11	3

places or under the shade of bushes and trees. Similarly, Jaipal (2020) documented that the desert fox used the dens according to seasons.

The resting dens were mainly used by the desert fox during summer season in the month of May and June because at that time the climate was so hot and the den protects the fox from the heat stock while in winter season desert fox used both type of dens during night and in early morning. Jaipal (2013) noted that the desert fox spent maximum time in the summer inside the den to avoid the strokes of warm air (Loo) and in the winter when the temperature falls to an irresistible range at night. During summer, desert fox used the resting den after 3:00 PM while breeding dens were used as a resting den from 12:00 PM to 3:00 PM because at that time, dens were about 2°C lower than the outer temperature.

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