

Observations on Dik-Dik *Madoqua kirkii* in the Namutoni area of Etosha National Park

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ABSTRACT

Observations were made on a population of dik-dik in Etosha National Park from 1983 to 1986. Most sightings were of an adult pair or a pair and one offspring. More family groups and single females were seen in the cold-dry season than during other seasons. Birth of lambs usually occurred in December and January. Sightings suggest that there are two breeding seasons in a year, although only two juveniles were seen in the winter months. Mortalities were low in the study population, with only 2 animals dying from vehicle injuries. No mortalities from disease were found.

INTRODUCTION

Of the five species of dik-dik found in Africa, only *Madoqua kirkii* (Günther 1880) occurs in the southern African subregion. *Madoqua kirkii* has six subspecies of which *Madoqua kirkii damarensis* is found in Namibia (Skinner & Smithers 1990). The dik-dik is a small antelope weighing approximately 5 kg with a shoulder height up to 45 cm (Tinley 1969).

In Namibia, where it is a protected species, dik-dik can be found from the Kunene River south to Mount Brukkaros and from the Pro-Namib east to Grootfontein. They are common in Etosha National Park in areas of suitable habitat: stony surfaces which support woodland or dense vegetation, at the pediment of hills or at the foot of outcrops (Tinley 1969).

STUDY AREA AND METHODS

This study was done in the stony *Terminalia-Spirostachys* woodland area (le Roux 1980) east of Namutoni camp in Etosha National Park (Fig. 1), where the density of dik-dik is high. The study area (8 500 ha) was surveyed throughout the year as part of the ranger's duties by driving all roads in the area and by foot patrols of 1-6 h. duration.

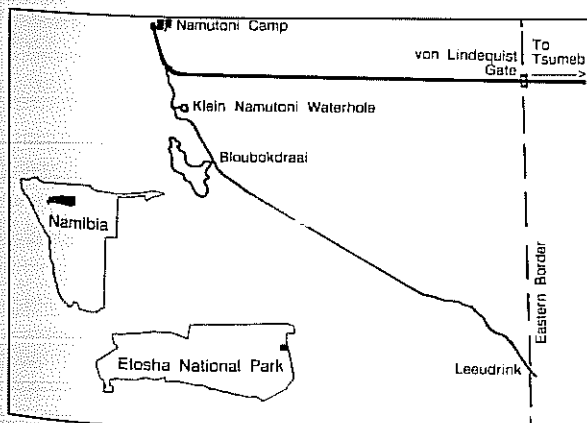


FIGURE 1: Map of study area in the Namutoni area of Etosha National Park, Namibia.

RESULTS AND DISCUSSION

In total, 323 sightings of dik-dik were recorded over the three-year period (1983-86). Observations included group size and composition, mating behaviour, reproductive status of females and the identification of items eaten whenever possible. For convenience, observations were grouped into the three climatic seasons recognized in Etosha: the hot-wet season from January to April; the cold-dry season from May to August; and the hot-dry season from September to December (Berry 1980).

There were an estimated 160 animals in the study area, but the majority concentrated within an area of 1 000 ha of preferred habitat. While the density for the study area was estimated at 0.02 animal per ha, the density in the concentration area was estimated to be 0.16 animal per ha. Animal numbers decreased by approximately 50 percent in the hot-wet season, when dik-dik frequently left their preferred territory (personal observations, this study). Otherwise, the population appeared stable.

The largest number of sightings of dik-dik (152; 47%) was of an adult pair (97; 30%) or one adult or pair and one offspring (55; 17%) (family group) which occupied and defended a definite territory (Table 1). Such a family is considered the most typical social unit (Tilson & Tilson 1986; Estes 1991). Of the 16 sightings of a single parent and offspring, 12 were of females and 4 were of males with a juvenile or subadult. The remaining sightings were of solitary subadults (smaller than adult size &/or with short horns—less than 4 cm) or adults, and groups of two to four individuals. No solitary juvenile animals (less than half the average adult size) were seen.

More family groups and single females were sighted in the cold-dry season than during the other seasons. Presumably this is because offspring born in December-January are larger by May and more easily seen as they join the activities of their parents, and females were neither hiding to lamb nor with newborn offspring. It could also be due, in part, to reduced foliage which increased sightability in the winter months. By the end of

TABLE 1: Number of sightings (total =323) of different social groups and total number of individual juvenile and subadult dik-dik by season.

Season	Number of sightings						No. of animals			
	Single M	Single F	M/F Pairs	Families ¹	Groups ²	SA ³	TOTAL	Juv ⁴	SA ⁴	TOTAL
Hot-wet	31	12	29	20	16	0	108	15	5	20
Cold-dry	17	18	38	34	10	6	123	2	41	43
Hot-dry	21	12	30	1	21	7	92	0	15	15
TOTAL	69	42	97	55	47	13	323	17	61	78
PERCENT	21	13	30	17	15	4				

¹Families: Male or female or mated pair plus juvenile or subadult.

²Groups: 2 or more adults, excluding mated pairs.

³SA (subadults: smaller than adult size &/or with horns <4 cm): one or more subadults in absence of adults.

⁴Juv (juveniles: < 1/2 adult size), SA: total numbers seen, with adults, alone or with other SA.

the hot-dry season and into the beginning of the hot-wet season, these offspring are maturing and most leave their families to establish their own territories. Females seem to be less visible at this time due to hiding out for lambing and nursing. Therefore, families were seen less often and single males were seen more often than in the cold-dry season.

Using a Chi-squared test, we found the group compositions to be significantly different between the three seasons ($\chi^2 = 43.23$, $df = 10$, $p < 0.001$). Comparing two seasons at a time, the greatest difference was found between the cold-dry and the hot-dry seasons ($\chi^2 = 33.11$, $df = 5$, $p < 0.001$).

Although other researchers described groups of up to six adults (Tinley 1969; Tilson & Tilson 1986), the reason for such a grouping remains unclear. They suggested these were temporary aggregations of neighboring groups, perhaps related, along common boundaries. Skinner and Smithers (1990) and Tinley (1969) report up to six animals may be seen during the dry season. In this study the largest group seen was four.

Observations indicate that the usual reproductive cycle begins during May and June with "courtship," when a male sniffs a female's urine to detect estrous. If the female is in estrous, then the male, with the crest hairs on his head erect, approaches her from behind and taps her hindquarters with his foreleg to determine her readiness for mating. Pregnant females are apparent from October through December (Fig. 2). Birth occurs from December into January, although juveniles are only observed later due to the habit of dik-dik to hide their young for the first few weeks of life (Estes 1991).

There were, however, two sightings of pregnant females in June and one of a lactating female in July as well as courtship behaviour in February during the course of the study. These sightings suggest that there are two breeding seasons in a year, although the success of the second birth period is not known. It appears the majority of females produce young once a year in December and January, and only a few females have offspring during the winter months. Only two newborn lambs were sighted in the cold-dry season (one each in May and June); it may be due to the low number of lambs produced at that time in the

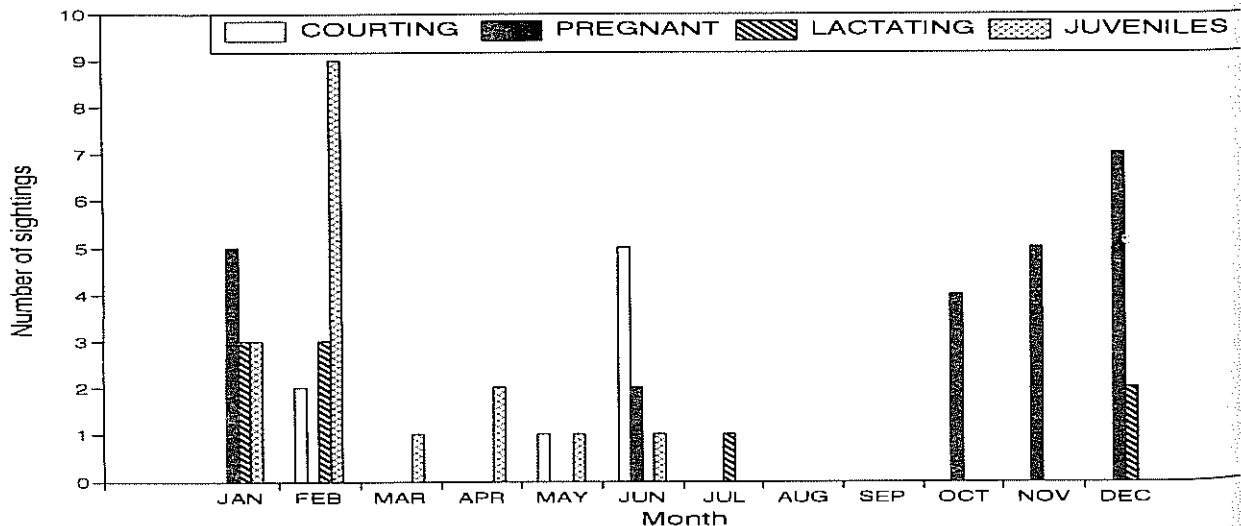


FIGURE 2: Numbers of sightings (total=57) of dik-dik indicating reproductive activities by month.

entire population, thus decreasing the chances of sightings, or due to high mortality among these lambs. In East Africa dik-dik reportedly produce two offspring a year, at the beginning and end of the rains (Kellas 1955; Estes 1991). Juveniles with one or both parents were sighted predominantly from January through April (Table 1), while subadults were seen throughout the year, but predominantly from May through December (56 of 61 animals).

Dik-dik pairs are believed to occupy the same territory throughout their lifespan (Tilson & Tilson 1986). In the Namutoni area, however, several pairs were observed to abandon their territories temporarily if the habitat were submerged during the rainy season. The varying areas occupied were referred to as winter and summer territories (69 percent of the rain occurs January through March – unpublished data, Etosha Ecological Institute). Once the rains ended and the preferred territory was again dry, the dik-dik returned. Tinley (1969) also noted seasonal movement of pairs from their usual territory, but he ascribed this to the growth of grasses which potentially obstructed the animals' view of danger.

Males fight with other males which intrude into their territory. These fights have been described as consisting of chasing and stabbing at each other with their horns without actual contact, called "air cushion fights" (Estes 1991). During this study actual horn-to-horn contact could be heard distinctly on several occasions when two males were observed fighting. Several of the known individuals had irregular, skew or broken horns, possibly due to intraspecific aggression. Otherwise, no bodily injury was ever observed and the fights were not considered life threatening. Females were never observed fighting.

Dik-dik communicate vocally with each other in several ways. To call its mate, the male or female sounded a single whistle. On several occasions, a dik-dik answered the observer's imitation of this whistle, most likely out of curiosity about a possible intruder. When frightened, or as an alarm, they made a quiet, soft trilling noise. When bounding away in fright, they emitted at each impact the 'sik-sik' sound for which they are said to be named. It sounded like a rapid exhalation of air on each impact, and is presumed to signal to other dik-dik the exact location of the fleeing animal. A visual signal of alarm, excitement or courtship behaviour is the raised rufous crest on top of their heads (Tinley 1969). Normally the crest lies flat on their foreheads between their ears.

Within the study area is an abundance of shrubs and trees which provide preferred food for dik-dik. Being predominantly browsers, the tiny ruminants were seen eating the leaves, flowers and fruit predominantly of *Acacia*, *Boscia* and *Croton* species, *Dichrostachys cinerea* and *Terminalia prunioides* (Table 2). Only young *Spirostachys africana* plants and the flowers of *Tribulus terrestris* were selected as food, while primarily dropped pods and leaves of *Acacia tortilis* and *Mundulea sericea* were chosen. Occasionally, when tender new green grass appeared with the rainy season, dik-dik were seen grazing *Enneapogon*

cenchroides and *Setaria verticillata*. Dik-dik were never seen eating *Colophospermum mopane*. Once, when one of these water-independent animals (Tinley 1969) looked as if it were about to drink at a waterhole, it actually ate the algae from the water's surface. As reported in Estes (1991), dik-dik were never observed drinking.

TABLE 2: Seasonal variation in plant species eaten by dik-dik in the Namutoni area of Etosha National Park by number of sightings per species (total sightings=64).

Trees, shrubs, herbs	Hot-wet (Jan-Apr)	Cold-dry (May-Aug)	Hot-dry (Sept-Dec)
<i>Acacia</i> spp.	6	3	6
<i>Boscia</i> spp.	0	4	1
<i>Croton</i> spp.	3	0	4
<i>Dichrostachys cinerea</i>	4	5	2
<i>Grewia</i> spp.	0	0	1
Legume (unidentified)	2	0	0
<i>Maytenus senegalensis</i>	0	0	2
<i>Mundulea sericea</i>	1	1	0
<i>Spirostachys africana</i>	1	2	0
<i>Terminalia prunioides</i>	6	2	2
<i>Tribulus terrestris</i>	2	0	0
Grasses			
<i>Enneapogon</i> spp.	1	0	0
<i>Eragrostis</i> spp.	1	0	0
<i>Setaria verticillata</i>	1	1	0

The same vegetation which provides food also provides cover for the antelopes, which depend on both flight and hiding to escape predators (Estes 1991). On two separate occasions, dik-dik were seen leaping under the protective branches of acacia shrubs to escape the diving attacks of a Giant Eagle Owl *Bubo lacteus* and a Martial Eagle *Polemaetus bellicosus*. The birds were forced to abandon their attacks by the thorny, thick vegetation. The only known successful attack on a dik-dik by a Giant Eagle Owl was photographed by a tour guide in 1990.

One observation was made of a dik-dik pair away from this normal protective habitat. At the edge of Etosha's barren pan near Twee Palms, at least three kilometres from the nearest suitable habitat, a male and female were sighted on 15 August 1983. They were observed walking in the direction of a tamboti *Spirostachys africana* woodland. The reason for their being in such a vulnerable, unlikely area and their subsequent fate remained unknown.

The only known mortalities in the dik-dik population during the study were two adults hit by vehicles on the tar road. Previously, 10 mortalities were reported between March 1976, when mortality records were first available in Etosha, and October 1981: one attributed to lion predation, three to leopard predation and six killed by vehicles. Since the study, only six mortalities have been reported among dik-dik: two hit by vehicles; one broken neck from running into a fence; one presumably killed by a Martial Eagle; one killed by a Giant Eagle Owl; and one dead of apparent starvation.

CONCLUSIONS

From behavioural observations spanning the three years of the study, several conclusions affecting possible management activities in the dik-diks' range were reached. Burning as a veld management practice was considered of little consequence to dik-dik because of their rocky habitat with normally little ground cover to burn. Only if the canopy were destroyed would fire affect the animals, which seldom move very far from their territories (Tilson & Tilson 1986) and thus might have difficulty finding sufficient food and shelter. Changes in the water supply likewise were seen as having no impact on the dik-dik, except where water would attract other species which could reduce canopy cover.

Additionally, it was felt bush encroachment would benefit the browsing animals, as would the occurrence in their territories of larger browsers such as kudu *Tragelaphus strepsiceros*, black-faced impala *Aepyceros melampus petersi*, rhinoceros *Diceros bicornis*, giraffe *Giraffa camelopardalis* and elephant *Loxodonta africana*. These herbivores break down tall vegetation normally out of reach of the tiny dik-dik and drop plant material they are eating, thus making available additional food. Again, only if these animals destroyed the canopy would they adversely affect the dik-dik. In the Namutoni area, however, sufficient vegetation was considered to be available to all browsing species, even during the dry seasons.

Lastly, mortalities due to two endemic and highly fatal diseases, anthrax and rabies, have not been recorded in dik-dik, even though their habitat lies within an area with a high incidence of both diseases (unpublished data, Etosha Ecological Institute) and they potentially are susceptible to both diseases. Therefore, a vaccination program appears unnecessary.

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