

Prey of caracal *Felis caracal* in two areas of Cape Province, South Africa

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Stuart, C.T. & Hickman, G.C. 1991. Prey of Caracal *Felis caracal* in two areas of Cape Province, South Africa. *J. Afr. Zool.* 105: 373-381.

The food of the caracal *Felis caracal* was studied in two regions of the Cape Province, South Africa by examination of stomach contents, scats and kills. The results of this study agree with previous studies, showing mammals from 15 g to 50 kg to be by far the most important prey category. Antelope, domestic stock and rodents were the most frequently encountered prey groups. Seasonal variations in the occurrence of prey items are noted. A total of 394 stomachs (246 with food content), 248 scats and 28 wild prey kills were analysed.

Les proies du chacal, Felis caracal, dans deux régions de la Province du Cap, Afrique du Sud. – La régime alimentaire du chacal, *Felis caracal*, a été étudié dans deux régions de la Province du Cap en Afrique du Sud, par examen des contenus stomacaux, des excréments et des proies tuées. Les résultats de cette étude s'accordent à ceux d'études antérieures, et montrent que les mammifères de 15 g à 50 kg constituent, et de loin, la catégorie de proies les plus fréquemment rencontrées. Des variations saisonnières sont notées. Un total de 394 estomacs (246 avec un contenu), 248 excréments et 28 proies sauvages tuées ont été analysés.

Key words: Food, stomach contents, scats.

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INTRODUCTION

The caracal *Felis caracal* is the most important wild predator of small domestic stock in the Cape Province. Despite the fact that large numbers of caracal are killed each year in control programmes they remain common and widespread.

Caracal are principally predators of small to medium-sized mammals but they also prey on birds and to a much lesser extent on reptiles (Azzaroli & Simonetta, 1966; Bester, 1982; Bothma, 1965; Rautenbach, 1982; Sapozhenkov, 1962; Smithers & Wilson, 1979; Smithers, 1971). Accurate figures are not available but several thousand small-stock units are killed each year in Cape Province by caracal (Directorate of Nature and Environmental Conservation records).

Few detailed studies of caracal prey in the Cape Province have been carried out (Grobler, 1981 and Moolman, 1984 in Mountain Zebra National Park; Palmer, 1985 - Karoo National Park; Pringle & Pringle, 1979 - Bedford District; Stuart, 1981).

In the present study stomach contents, scats and wild prey kills were used to investigate prey of caracal in two regions of the Cape Province. Comparisons with other studies of caracal diet are made.

MATERIALS AND METHODS

Material for the current study was collected in two regions of the Cape Province (Fig. 1). Region A was situated in the southwestern Cape Province and consisted of coastal sandveld through to rolling karroid hills; Region B was loca-

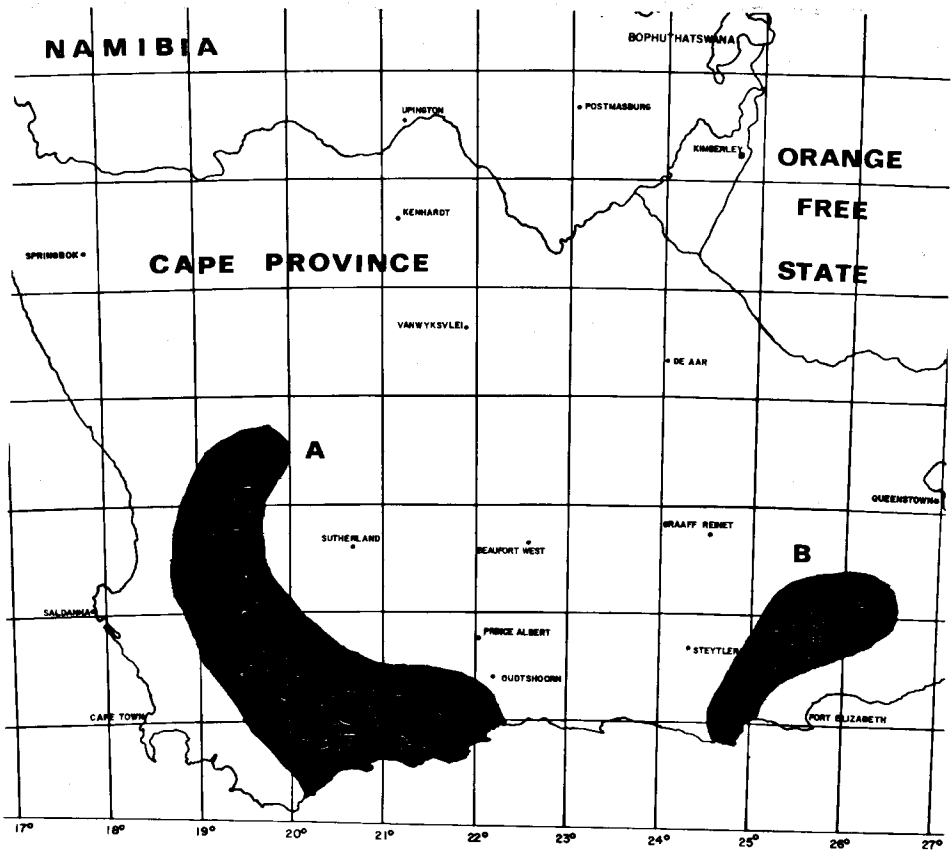


Fig. 1. — The study areas in Cape Province, South Africa. (A) Southwestern region; (B) Eastern region.

ted in the eastern Cape Province and extended from coastal scrub woodland to montane grassland. Both areas included extensive small-stock farms.

Caracal stomachs were obtained from both regions (246 stomachs with identifiable content). All caracal were collected during the course of problem animal control operations. Whole stomachs were preserved for later analysis in the laboratory. Stomach content samples were washed and identifiable fragments separated for identification. Food items were identified by macroanalysis of undigested portions, as described for other carnivore diet studies (Grafton, 1965; Stuart, 1976). In instances of doubt, hair was examined microscopically and identified

from scale patterning and cross-section as described by Brunner & Coman (1975). Samples were compared with a comprehensive reference collection. Where there was any doubt as to identify the sample was designated as unidentified.

Caracal scats were collected in the karroid hill area (Robertson Karoo) of the southwestern Cape region. Caracal scats were recognised by their typical cat-like "segmented" appearance and distinguished from those of the African wild cat *Felis libyca* by their larger size (< 18 mm) and random manner of deposit. African wild cat scats in the study area were nearly always buried, as in the manner of the domestic cat.

Two hundred and forty eight scats were collected and stored individually. Each scat was soaked in water until soft, macerated and sieved to remove fine material. Identification followed the same pattern as for stomach content analysis.

During the course of field work 28 antelope killed by caracal were recorded. The method of killing and feeding were used to identify the predator. All kills were recorded in the southwestern Cape Province.

RESULTS

Stomach contents

A sample of 394 stomachs was collected, of which 148 (37%) were empty. Analyses of the 246 stomach contents showed that the caracal fed on a wide range of mammals, with other groups only being minimally represented (Table 1). The sample was first analysed as a whole and then on a seasonal basis (spring/summer or autumn/winter) (Tables 2 and 3). Mammal prey made up 91,3% of all items in stomachs, with birds making up 8,1% of the total.

Antelope made up more than one third of occurrences of the prey items identified of caracal in the present study. Cape grysbok *Raphicerus melanotis* were found in 10,4% of all stomachs but only from samples collected in the southwestern Cape Province. Klipspringer *Oreotragus oreotragus* (0,3%) and Grey rhebok *Pelea capreolus* (0,3%) were likewise only recorded from the southwestern Cape Province. Blue duiker *Cephalophus monticola* (1,8%) and Mountain reedbeek *Redunca fulvorufula* (1,2%) were only recorded in stomachs from the eastern Cape Province. Common duiker *Sylvicapra grimmia* was the most frequently encountered antelope in stomach samples from the eastern Cape study area. Domestic stock

were the second most important group with 27,8% of stomachs containing sheep or goat remains. The relatively high incidence of domestic stock in the diet can be related to hunters killing caracal in areas where stock-killing had taken place, thus increasing the chances of stock-killing caracal being taken. Carnivores, present in 6,1% of the stomachs, of seven species included the remains of three caracal cubs. The latter were in three separate stomachs, each from adult male caracal. Only two bird samples were identified to species level, namely crowned guinea-fowl (*Numida meleagris*) and Cape white-eye (*Zosterops pallidus*).

Green grass was present in 17 (5,2%) stomachs but this was not classed as food and does not appear on the Table.

A number of prey differences (stomach samples) were encountered in the two study areas when compared on a seasonal basis. Antelope were 21% more frequently encountered in the summer sample from the southwestern Cape than the winter sample. However, they were 11,2% more frequent in the eastern Cape winter sample. Although domestic stock remains were found equally in both season samples from the eastern Cape, in the southwestern Cape they were twice as frequently encountered in the winter sample. Hyrax were more frequent in summer samples from both study areas. Carnivore remains were absent from the eastern Cape samples but present in both southwestern Cape samples, with a 9,2% occurrence in the summer months.

Scats

Prey items and their frequency of occurrence in a sample of 248 caracal scats collected in the eastern Robertson Karoo are presented in Table 4. The high incidence of rodent remains in the scats, particularly *Otomys unisulcatus*, coincided with an increase in the numbers of

Table 1. - Number and frequency of different prey in 246 caracal stomachs from Cape Province.

Prey Species	No. recorded prey items	Relative %
ANTELOPE	108	33,0
<i>Raphicerus melanotis</i>	34	10,4
<i>Sylvicapra grimmia</i>	23	7,0
<i>Tragelaphus scriptus</i>	9	2,9
<i>Raphicerus campestris</i>	8	2,4
<i>Cephalophus monticola</i>	6	1,8
<i>Redunca fulvorufula</i>	4	1,2
<i>Oreotragus oreotragus</i>	1	0,3
<i>Pelea capreolus</i>	1	0,3
Unidentified	22	6,7
DOMESTIC STOCK	91	27,8
<i>Ovis aries</i>	69	21,0
<i>Capra hircus</i>	22	6,8
RODENTS	32	9,8
<i>Rhabdomys pumilio</i>	11	3,4
<i>Pedetes capensis</i>	3	0,9
<i>Cryptomys hottentotus</i>	2	0,6
<i>Bathyergus suillus</i>	2	0,6
<i>Aethomys namaquensis</i>	1	0,3
<i>Otomys irroratus</i>	1	0,3
Unidentified	12	3,7
HYRAX	22	6,7
<i>Procavia capensis</i>	22	6,7
LAGOMORPHS	23	7,0
<i>Lepus</i> spp.	23	7,0
CARNIVORES	20	6,1
<i>Herpestes pulverulentus</i>	8	2,5
<i>Felis caracal</i>	3	0,9
<i>Ictonyx striatus</i>	2	0,6
<i>Cynictis penicillata</i>	2	0,6
<i>Atilax paludinosus</i>	2	0,6
<i>Genetta</i> spp.	2	0,6
<i>Herpestes ichneumon</i>	1	0,3
INSECTIVORES	3	0,9
<i>Crocidura</i> spp.	2	0,6
<i>Chrysochloris asiatica</i>	1	0,3
TOTAL MAMMALS	299	91,3
BIRDS	26	8,1
FISH	1	0,3
CARRION	1	0,3
TOTAL	327	100 %

Table 2. - Seasonal differences of prey remains in caracal stomachs from Southwestern (winter rainfall) and Eastern (summer rainfall) Cape Province.

Prey type	Southwestern Cape			Eastern Cape		
	Summer	Winter	p (1 df)	Summer	Winter	p (1 df)
Antelope	60,8	39,8	7,25	30,0	41,2	4,183
Domestic stock	13,0	27,5	16,17	40,0	39,6	0,004
Hares	3,7	3,1	0,09	5,0	4,2	0,128
Rodents	4,3	14,3	23,35	5,0	8,3	2,178
Unidentified Mammals	8,7	6,1	0,77	20,0	2,1	1,682
Hyrax	8,7	3,1	3,605	-	12,5	2,81
Carnivores	4,3	9,2	5,584	-	-	-
Insectivores	-	2,0	2	-	-	-
Birds	8,7	12,2	1,408	10,0	6,2	1,44
			58,12			12,43
			(7 df)			(6 df)
Total number of stomachs	38	93		28	47	

Table 3. - Seasonal differences of prey remains in caracal stomachs Southwestern Cape Province (SWC) - winter rainfall - and Eastern Cape Province (EC) - summer rainfall.

Prey type	Summers			Winters		
	SWC	EC	p (1 df)	SWC	EC	p (1 df)
Antelope	60,8	39,8	15,6	39,8	41,2	0,049
Domestic stock	13,0	56,0	56,0	27,5	39,6	5,32
Hares	3,7	5,0	0,457	3,1	4,2	0,390
Rodents	4,3	5,0	0,114	14,3	8,3	2,517
Unidentified Mammals	8,7	5,0	1,574	6,1	2,1	2,623
Hyrax	8,7	20,0	14,68	3,1	12,5	28,50
Carnivores	4,3	-	4,3	9,2	-	9,2
Insectivores	-	-	-	2,0	-	2,0
Birds	8,7	10,0	0,194	12,2	6,2	2,95
			107,11			53,55
			(7 df)			(6 df)
Total number of stomachs	38	28		93	47	

Table 4. - Number and frequency of different prey items in 248 caracal scats from the Robertson Karoo, southwestern Cape Province.

Prey Species	No. recorded occurrences	Relative % occurrences
RODENTS	155	50,0
<i>Otomys untsulcatus</i>	57	18,4
<i>Rhabdomys pumilio</i>	17	5,5
<i>Otomys irroratus</i>	16	5,2
<i>Tatera afra</i>	4	1,3
<i>Hystrix africaeaustralis</i>	1	0,3
Unidentified	60	19,3
DOMESTIC STOCK	52	16,8
<i>Ovis aries</i>	28	9,0
<i>Capra hircus</i>	24	7,8
ANTELOPE	34	10,9
<i>Sylvicapra grimmia</i>	15	4,8
<i>Raphicerus campestris</i>	8	2,6
<i>Oreotragus oreotragus</i>	7	2,3
<i>Pelea capreolus</i>	4	1,3
HYRAX	28	9,0
<i>Procavia capensis</i>	28	9,0
LAGOMORPHS	16	5,2
<i>Lepus</i> spp.	16	5,2
CARNIVORES	9	2,9
<i>Herpestes pulverulentus</i>	5	1,6
<i>Atilax paludinosus</i>	4	1,3
BIRDS	16	5,2
TOTAL	310	100 %

small rodent species following good rains between September 1980 and April 1981. The occurrence of antelope remains, correlates approximately with the abundance of the different antelope species occurring in the study area.

Although bird remains accounted for 5,2 % of prey occurrences, only two species were identified, namely crowned guinea-fowl (*Numida meleagris*) and black korhaan (*Afrotis afra*).

Kills

With the exception of domestic stock

kills (excluded from this study), all other kills examined were antelope. Twenty eight antelope kills, of six species, were recorded. Fifteen were examined from the coastal area of the southwestern Cape Province study area and thirteen from the inland area of the same region (Table 5). Only fresh kills were recorded as confusion could arise as older carcasses were visited by scavenging carnivores. Smaller prey species are either completely, or almost entirely consumed, and therefore no evidence remains or is so scant that it is easily overlooked. Antelope (and domestic stock) are usually killed with a bite on the throat at the junction of the jaw and throat. Occasionally kills were exe-

Table 5. - Caracal kills recorded in the southwestern Cape Province

Prey Species	Age	Sex	Number
<i>Raphicerus melanotis</i>	Adult	Male	4
	Adult	Female	2
	Juvenile	-	1
<i>Sylvicapra grimmia</i>	Adult	Male	1
	Adult	Female	4
	Juvenile	-	2
<i>Tragelaphus scriptus</i>	Subadult	Male	1
	Subadult	Female	3
	Juvenile	-	2
<i>Raphicerus campestris</i>	Adult	Male	1
	Adult	Female	2
	Juvenile	-	1
<i>Pelea capreolus</i>	Adult	Male	2
	Juvenile	-	1
<i>Oreotragus oreotragus</i>	Subadult	Male	1
Total			28

cuted by a nape bite, or a combination of nape bite, shifted to a throat bite. In 27 of the 28 recorded kills, the prey was eaten where it was killed and only in two cases was the prey dragged a short distance to cover. Antelope carcasses were opened at the anus and the flesh on the hindquarters was partly or completely eaten. In two cases flesh was also eaten from one shoulder.

DISCUSSION

The findings of the present study confirm that the caracal in the southern sector of the Cape Province is principally a predator of small (15 g) to medium-sized (50 kg) mammals, with a 94,8 % occurrence in scats and 91,3 % occurrence in stomach contents in the present study. In three separate studies (Grobler, 1981; Moolman, 1984; Palmer, 1985) undertaken in Cape Province the mammal component in caracal scats ranged from an 86 % occurrence to 96,9 % of recorded items. In the case of the lowest percentage occurrence (86 %), Palmer (1985) collected his sample in the Karoo National Park. This was the only sample in which invertebrates were recorded as

prey items (17 %) and there appear to be no literature records of insect or arachnid prey. That there was some confusion with the scats of the African wild cat (*Felis libyca*) therefore seems to be a distinct possibility.

A summary of the four scat-based diet studies in Cape Province are summarised for their mammal component in Table 6.

No attempt was made to quantify the proportional representation of the different prey in stomachs or in scats. Calculations to compensate for prey body size (Grobler, 1981) also suffer from bias because they assume that large prey are completely consumed by the predator, that records of small prey do not involve more than one individual, and that all records are for adult animals. A further bias in the case of scats may arise from remains of single large prey animals that are defecated in more than one scat and this may result in the conclusion that this may overestimate the total number of large prey animals killed.

Although Pringle & Pringle (1979) found that caracal did not return to feed on larger kills or eat carrion, Grobler

Table 6. - Mammal components in the diet of caracal as determined from scat analyses in four separate studies undertaken in Cape Province.
(MZNP = Mountain Zebra National Park; KNP = Karoo National Park).

Study area	Present Study	Grobler (1981)	Moolman (1984)	Palmer (1985)
	Robertson Karoo	MZNP	MZNP/ Cradock	KNP
Prey Species	% Occurrence			
ANTELOPE	10,9	23,6	13,5/10,3	22,0
DOMESTIC STOCK	16,8	-	-/22,9	-
HYRAX	9,0	53,3	52,5/30,3	17,0
RODENTS	50,0	5,3	8,5/24,0	30,0
HARES	5,2	10,6	15,3/9,4	15,0
CARNIVORES	2,9	0,9	5,1/-	2,0
TOTAL %	94,8 %	93,7 %	94,9 %/96,9 %	86,0 %
NO. SCATS	248	200	100/85	100

(1981) observed that in most cases of antelope kills in the Mountain Zebra National Park caracal did return to feed on kills. In the present study caracal only rarely returned to feed on a kill but this difference in behaviour may be due to their persecution in sheep farming areas. It therefore appears that under protected conditions caracal may return to feed on kills but in farming areas where they are harassed and persecuted they rarely return to a kill. As caracal have been heavily persecuted over much of the Cape Province on account of predation on small stock, it seems likely that returning to kills will be the exception rather than the rule. In the case of larger kills it is estimated that a maximum of up to 2 kg of flesh is eaten at one time. This is based on the findings of Grobler (1981) on the consumption of a free ranging tame animal at 796 g per 24 hour period and 536 g per 24 hour period for captive animals (Stuart, 1982).

The eating of carrion by caracal was doubted by Pringle & Pringle (1979) but Grobler (1981) found that caracal in the Mountain Zebra National Park did scavenge. Findings in the present study were

that although the eating of carrion is rare, nevertheless it does take place. Scavenging from a Cape fur-seal (*Arctocephalus pusillus*) carcass was recorded once and caracal tracks were frequently encountered along the high water mark in the southwestern Cape study area. It would therefore seem likely that scavenging on marine carrion could play a role in the lives of caracal in coastal areas.

Caracal in the Cape Province are, principally, predators of small to medium-sized mammals and of particular importance to their conservation standing is their predilection to preying on domestic smallstock within the study area.

ACKNOWLEDGEMENTS

The Chief Directorate of Nature and Environmental Conservation is thanked for providing logistical and financial support. The many farmers and hunters who provided material made this project possible. The technical assistance of Bessel Munnik and Penny Meakin is appreciated. Peter Norton and Ric Bernard read early drafts of this paper.