

Food preferences of oribi *Ourebia ourebi* in the Golden Gate Highlands National Park

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During a two-year study on the ecology of oribi *Ourebia ourebi* (Zimmermann, 1783) in the Golden Gate Highlands National Park, plant species fed on by oribi were noted. The oribi fed on a total of 22 plant species. Feeding preference categories were assigned according to the degree of use of different plant species, based on direct observation and on a preference rating. The oribi in the Golden Gate Highlands National Park showed a seasonal variation in feeding preferences, utilising several species of forbs primarily during the summer and a marked difference between per cent frequency utilisation of plant species and actual preference rating according to availability of species and for certain plant parts, e.g. for *Sporobolus centrifugus*.

Key words: Golden Gate Highlands National Park, oribi, *Ourebia ourebi*, feeding preferences.

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Introduction

Oribi *Ourebia ourebi* originally populated the area currently incorporated into the Golden Gate Highlands National Park (Edwards 1969; Von Richter, Lynch & Wessels 1972) but have, however, disappeared from almost all of the rest of the Orange Free State (Von Richter *et al.* 1972; Lynch 1983). Oribi were re-established in the Golden Gate Highlands National Park (GGHNP) in 1971 and 1973.

As part of a project on the ecology of this re-established population of oribi in the GGHNP data were collected on the plant species fed on by oribi in that park over the period March 1982 to December 1983.

Oribi are classified as selective feeders by several authors (Mentis 1978; Viljoen 1982; Rowe-Rowe 1982; Rowe-Rowe & Scotcher 1986). However, only Viljoen (1982) provides comprehensive data on oribi feeding preferences. In view of this deficiency, the fact that feeding preference plays a role in the ecological separation of ungulates (Leuthold 1977) and the importance of such data in management of oribi, data were collected where possible on oribi food preferences in the GGHNP during observations on habitat selection.

Study area

The Golden Gate Highlands National Park is situated in the Rooiberge of the eastern Orange Free State, 25 km east of Clarens and 70 km south-east of Bethlehem. At the time of this study the GGHNP covered the area between 28°29'S and 28° 34'S, and between 28° 34'E and 28° 39'E. The park is bordered by privately owned farms, while the southern boundary is 3 km from the Lesotho border. The two major geological formations in the park are the Clarens Sandstone and Drakensberg Basalt formations. The climate of the study area is characterised by summer rainfall, temperate summers and cold winters. The highest mean maximum daily temperature of 27,7 °C for the Golden Gate weather station was recorded in January and a lowest mean

Table 1
Months of the year in which various plant species were utilised (X) by oribi in the Golden Gate Highlands National Park of the Orange Free State. Data are given in order of preference category and were collected March 1982-December 1983

Plant species	Month utilised												Frequency: % of total obs	Preference category ⁺
	J	F	M	A	M	J	J	A	S	O	N	D		
<i>Sporobolus centrifugus</i>	X	X	X	X						X	X	X	17,6	a
<i>Themeda triandra</i>	X	X	X	X	X			X	X	X	X	X	10,8	b
<i>Monocymbium ceresiiforme</i>			X	X		X	X	X					9,1	b
<i>Watsonia densiflora</i>	X				X	X	X				X		8,9	b
<i>Cyperus obtusiflorus</i>	X				X	X			X	X			8,2	b
<i>Andropogon schirensis</i>				X	X	X							6,9	b
<i>Eragrostis curvula</i>	X	X	X	X	X	X	X	X	X	X	X	X	6,3	b
<i>Heteropogon contortus</i>	X							X	X	X			5,7	b
<i>Tristachya leucothrix</i>	X	X		X				X	X	X			5,2	b
<i>Pennisetum clandestinum</i>								X	X				3,7	c
<i>Polygala hottentotta</i>		X	X							X			3,3	c
<i>Hypoxis argentea</i>	X										X		3,0	c
<i>Eulophia clavicornis</i>					X	X		X					2,7	c
<i>Pseudognaphalium undulatum</i>								X	X	X			2,1	c
<i>Aristida junciformis</i>								X	X				1,8	c
<i>Elionurus muticus</i>							X	X					1,2	c
<i>Stiburus alopecuroides</i>								X					1,1	c
<i>Gazania krebsiana</i>					X	X	X						0,7	c
<i>Cyperus rigidifolius</i>										X			0,7	c
<i>Helichrysum appendiculatum</i>	X												0,3	c
<i>Eragrostis caesia</i>	X												0,3	c
<i>Helichrysum callicomum</i>	X												0,3	c

⁺ Preference category of Viljoen (1982) a = more than 11 % utilisation

b = 5-11 % utilisation

c = < 5 % utilisation (Viljoen 1982)

Table 2

Various plant structures of various plant species used, percent frequency of total observations, percent frequency of the species according to wheel point data and preference rating (PR)^a by oribi in the Golden Gate Highlands National Park (March 1982 - December 1983)

Plant species	Number of observations Plant structure utilised				%Frequency PR ^a (wheel point)		
	Roots	Leaves	Flowers and/ or inflo- rescences	Total	%Frequency		
<i>Sporobolus centrifugus</i>	-	-	118	118	17.6	5.6	3.1
<i>Themeda triandra</i>	-	72	-	72	10.8	9.4	1.1
<i>Monocymbium ceresiiforme</i>	-	61	-	61	9.1	6.9	1.3
<i>Watsonia densiflora</i>	2	58	-	60	8.9	0.4	22.2
<i>Cyperus obtusiflorus</i>	-	50	5	55	8.2	1.8	4.6
<i>Andropogon schirensis</i>	-	46	-	46	6.9	-	-
<i>Eragrostis curvula</i>	-	42	-	42	6.3	19.5	0.3
<i>Heteropogon contortus</i>	-	38	-	38	5.7	17.6	0.3
<i>Tristachya leucothrix</i>	-	35	-	35	5.2	7.3	0.7
<i>Pennisetum clandestinum</i>	-	25	-	25	3.7	-	-
<i>Polygala hottentotta</i>	-	10	12	22	3.3	0.02	165.0
<i>Hypoxis argentea</i>	-	-	20	20	3.0	0.1	30.0
<i>Eulophia clavicornis</i>	-	18	0	18	2.7	-	-
<i>Pseudognaphalium undulatum</i>	-	6	8	14	2.1	0.1	21.0
<i>Aristida junciformis</i>	-	12	-	12	1.8	2.6	0.7
<i>Elionurus muticus</i>	-	8	-	8	1.2	10.2	0.1
<i>Stiburus alopecuroides</i>	-	7	-	7	1.1	8.3	0.1
<i>Gazania krebsiana</i>	-	4	1	5	0.7	0.1	7.0
<i>Cyperus rigidifolius</i>	-	-	5	5	0.7	0.4	1.8
<i>Helichrysum appendiculatum</i>	-	-	2	2	0.3	-	-
<i>Eragrostis caesia</i>	-	-	2	2	0.3	2.9	0.1
<i>Helichrysum callicomum</i>	-	-	2	2	0.3	0.06	5.0
Total	2	492	175	669			

^a Preference Rating according to Shackleton *et al.* 1985 = $\frac{\% \text{ of species in diet}}{\% \text{ of species available}}$

minimum daily temperature of 1,5 °C in July (Weather Bureau 1987) (n=24). The mean annual rainfall is 806 mm (Weather Bureau 1987). Although plant sampling was done at Golden Gate as early as 1965 (Roberts 1969), only Potgieter (1982) has provided data on vegetation types in the park. Potgieter (1987) distinguishes two main vegetation types viz. those with *Themeda* dominating and those where *Themeda* is poorly represented or entirely absent. Two of Acocks' (1975) veld types are represented in the park viz. Highland Sourveld (no. 44) and the *Themeda-Festuca* Veld (no. 58).

Methods

The data on the feeding preference of oribi were collected complementary to habitat use data which will be reported elsewhere. In the current study fresh oribi spoor was followed wherever possible and plants that had just been eaten were noted. These data were noted only to determine the use

of certain plants and parts of plants and no attempt was made to determine the bulk intake of plant material. Initially it proved difficult to follow oribi spoor in the grassveld. However, with practice, and help from the local game rangers, it soon proved feasible to collect reliable data in this way. Along with data on the plant species fed on, the date of the observation was also noted to determine seasonal use. Food preferences are categorised after Viljoen (1982) as follows:

Preference a: more than 11 % utilisation of plant species.

Preference b: 5-11 % utilisation of plant species

Preference c: < 5 % utilisation of plant species.

During the course of this study the area inhabited by the oribi was traversed using the wheel point method (Tidmarsh & Havenga 1955) to gather information on plant species composition. A total of 4 956 points were sampled and the plant closest to the point, hits and misses were recorded. A percent frequency value was thus obtained and a preference rating (PR) calculated as percent of a plant species eaten per percent frequency of that plant in the area. This preference rating was used by Shackleton & Walker (1985) to identify dietary species selection of eight oribi in the Mount Sheba Nature Reserve in the eastern Transvaal. All plant names listed are according to Gibbs Russell, Reid, Van Rooy & Smook (1985), and Gibbs Russell, Welman, Retief, Immelman, Germishuizen, Pienaar, Van Wyk & Nicholas (1987).

Results

Oribi in the Golden Gate Highlands National Park fed on 22 plant species but did so on various parts of the plants at different times of the year (Tables 1 and 2).

In terms of percent frequency of total utilisation certain plants (*Sporobolus centrifugus*, *Themeda triandra*, *Monocymbium cerasiiforme*, *Watsonia densiflora*, *Cyperus obtusiflorus*, *Andropogon schirensis*, *Eragrostis curvula*, *Heteropogon contortus* and *Tristachya leucothrix*) seem to dominate (category a and b utilisation according to Viljoen 1982). However actual preference is a different matter.

If it is assumed that certain species evident in the diet but not contributing to percent frequency of a comprehensive wheel point survey are highly selected for, then oribi's primary preferences are *Andropogon schirensis*, *Pennisetum clandestinum*, *Eulophia clavicornis* and *Helichrysum appendiculatum*. Following in descending order of preference according to preference rating are *Hypoxis argentea*, *Polygala hottentotta*, *Watsonia densiflora*, *Pseudognaphalium undulatum*, *Gazania krebsiana*, *Helichrysum callicomum*, *Cyperus obtusiflorus*, and *Sporobolus centrifugus*.

It was also noted that oribi were selective for certain parts of the plants on which it fed and particularly so for the geophytes and annuals (Table 2). Selectivity was shown for the inflorescences of *Sporobolus centrifugus* and the flowers of *Hypoxis argentea*, *Helichrysum callicomum* and *H. appendiculatum*.

Oribi in the Golden Gate Highlands National Park also showed selective variations in plants fed on from season to season. Selection for certain parts of the same plant species during different seasons was also evident. For example, oribi fed on the leaves of *Watsonia densiflora* during the summer (October to March) but on the corms of this species during the early and late winter (April to June and July to September respectively). On two separate occasions oribi were observed digging to reach these corms. *Eragrostis curvula* was fed on throughout the year while *Sporobolus centrifugus* was fed on during the summer (October to March). *Andropogon schirensis* on the other hand was utilised only during the early winter (April to June).

A seasonal grouping is evident in grasses, forbs and geophytes fed on by oribi in the park. Among species used in the summer are *Hypoxis argentea*, *Helichrysum appendiculatum*, *H. callicomum* and *Polygala hottentotta*. Species fed on during the winter include *Eulophia*

clavicornis, *Gazania krebsiana* and *Pseudognaphalium undulatum*. Two species of sedges were used viz. *Cyperus obtusiflorus* for five months (January, May, June, October and November) of the year and *C. rigidifolius* in December.

In Table 2 a preference rating (PR) as described by Shackleton *et al.* (1985) was computed. This rating is the percent frequency of a species in the diet divided by the percent frequency of the species available. Unfortunately some species (*A. schirensis*, *Pennisetum clandestinum*, *E. clavicornis* and *H. appendiculatum*) were not encountered in the 4 956 point survey and although percent frequency occurrence can be computed, high selectivity is assumed.

Discussion

In contrast to typical grazers like the black wildebeest *Connochaetes gnou* and the zebra *Equus burchellii* which have broad undifferentiated muzzles, oribi have a sharp, narrow head and muzzle. These characteristics are typical of selective feeders enabling them to reach plants or plant structures.

Several authors have used direct observations to determine feeding preferences of herbivores (Lamprey 1963; Van Zyl 1965; Tinley 1969) and more specifically oribi (Viljoen 1982). Field (1968) points out the difficulties of using direct observations to determine feeding preferences. Differences of opinion are evident as to the classification of oribi on the basis of their feeding strategy varying from "bulk and roughage" (Hofmann & Stewart 1972) to selective (Jarman 1974) and mixed feeders (Viljoen 1982). Oribi require a relatively high energy requirement per unit body mass owing to a higher metabolic rate than larger antelope (Kleiber 1961). The small size of an oribi obliges it to feed on high-quality food plants or to take parts of plants selectively. Being a typical grassland species and having no browse component in the diet, oribi apparently supplement the grass's nutritional homogeneity by feeding selectively on certain plant parts e.g. inflorescences of *Sporobolus centrifugus*. The sedentary nature of oribi also enhances familiarity with the available food resource. These results support those of Viljoen (1982) in classifying oribi as "mixed feeders". Rowe-Rowe & Scotcher (1986) recorded oribi in the Natal Drakensberg as feeding mainly on grasses, while also taking some forbs, but still being highly selective for plant species and plant parts.

On a seasonal basis the oribi is considered by Mentis (1978) to be forced by a winter decline in nutrient concentrations of herbage to exercise greater selection. Other authors such as Oliver, Short & Hanks (1978) and Rowe-Rowe & Scotcher (1986) also comment on decline of feed quality in the Natal Drakensberg during the winter. Viljoen (1982) reports only slight variation in seasonal differences in selection of plant species of oribi in the south-eastern Transvaal. Monfort & Monfort (1974) record oribi preference for certain grass species in the Akagera National Park in Rwanda while Tinley (1969) records only slight seasonal variation in oribi food selection in the Gorongosa National Park.

Shackleton *et al.* (1985) used a preference rating to determine the species feeding preference of eight oribi in the Mount Sheba Nature Reserve in the eastern Transvaal. The findings of this study in terms of pre-burn preference for certain grass species (*A. schirensis*) correlates well with those authors. What is significant is that Shackleton & Walker (1985) show a significant increase in forbs in unburned veld, a possible indication as to why Golden Gate oribi show such a high selectivity for certain forbs.

Conclusions

From the observations of oribi feeding in the Golden Gate Highlands National Park it is clear that these oribi show different degrees of selectivity for different plant species and also show definite seasonal variation in the diet. Although the oribi in the Golden Gate Highlands National Park feed chiefly on grasses they can be classified as mixed feeders, taking both grasses and forbs. A distinct preference is evident for certain plant structures at certain times of the year. Oribi in the GGHNP can thus be classified as "mixed feeders" showing a high degree of selectivity for plant species and plant structures. These oribi show consistent preference for *Andropogon schirensis*, *Pennisetum clandestinum*, *Eulophia clavicornis*, *Helichrysum appendiculatum*, *Hypoxis argentea*, *Polygala hottentotta*, *Watsonia densiflora*, *Pseudognaphalium undulatum*, *Gazania krebsiana*, *Helichrysum callicomum*, *Cyperus obtusiflorus* and *Sporobolus centrifugus*. There are also indications that the oribi habitat at Golden Gate is burnt too infrequently.

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References

- ACOCKS, J.P.H. 1975. Veld types of South Africa. *Memoirs of the Botanical Survey of South Africa* 40: 1-128.
- EDWARDS, K. 1969. Vanishing oribi. *Inyala News* 16: 9-10.
- FIELD, C.R. 1968. Method of studying the food habits of wild ungulates in Uganda. *Proc. Nutr. Soc.* 27: 172-173.
- GIBBS RUSSELL, G.E., D. REID, J. VAN ROOY and L. SMOOK. 1985. List of species of southern African plants. Edition 2. Part 1. *Memoirs of the Botanical Survey of South Africa* 51: 1-152.
- GIBBS RUSSELL, G.E., W.G. WELMAN, E. RETIEF, K.L. IMMELMAN, G. GERMISHUIZEN, B.J. PIENAAR, M. VAN WYK and A. NICHOLAS. 1987. List of species of southern African plants. Edition 2 Part 2. *Memoirs of the Botanical Survey of South Africa* 56: 1-270.
- HOFMANN, R.R. and D.R.M. STEWART. 1972. Grazer or browser: a classification based on the stomach structure and feeding habits of East African ruminants. *Mammalia* 36: 226-240.
- JARMAN, P.J. 1974. The social organization of antelope in relation to their ecology. *Behaviour* 48: 215-267.
- KLEIBER, M. 1961. *The Fire of Life*. New York: John Wiley & Sons.
- LAMPREY, H.F. 1963. Ecological separation of the large mammal species in the Tarangire Game Reserve, Tanganyika. *East African Wildlife Journal* 1: 63-92.
- LEUTHOLD, W. 1977. *African Ungulates. A Comparative Review of their Ethology and Behavioural Ecology*. Springer-Verlag, Berlin, Heidelberg and New York.
- LYNCH, C.D. 1983. The mammals of the Orange Free State. *Memoirs of the National Museum, Bloemfontein* 18: 160-162.
- MENTIS, M.T. 1978. Population limitation in grey rhebuck and oribi in the Natal Drakensberg *Lammergeyer* 26:19-28.
- MONFORT, A. and N. MONFORT. 1974. Notes sur l'ecologie et le comportement des oribis (*Ourebia ourebi*, Zimmermann, 1783). *Terre Vie* 28(2): 169-208.

- OLIVER, M.D.N., N.R.N. SHORT and H. HANKS. 1978. Population ecology of oribi, grey reedbuck and mountain reedbuck in Highmoor State Forest Land, Natal. *South African Journal of Wildlife Research* 8(3): 95-105.
- POTGIETER, J.W. 1982. 'n *Plantekologiese studie van die Golden Gate Hoogland Nasionale Park Clarens, Oranje-Vrystaat*. M.Sc. thesis, University of the Orange Free State.
- ROBERTS, B.R. 1969. The vegetation of the Golden Gate Highlands National Park. *Koedoe* 12: 15-28.
- ROWE-ROWE, D.T. 1982. Influence of fire on antelope distribution and abundance in the Natal Drakensberg. *South African Journal of Wildlife Research* 12: 124-129.
- ROWE-ROWE, D.T. and J.S.B. SCOTCHER. 1986. Ecological carrying capacity of the Natal Drakensberg for wild ungulates. *South African Journal of Wildlife Research* 16(1): 12-16.
- SHACKLETON, C. and B.H. WALKER. 1985. Habitat and dietary species selection by oribi antelope at Mount Sheba Nature Reserve. *South African Journal of Wildlife Research* 15: 49—52.
- TIDMARSH, C.E.M. and C.M. HAVENGA. 1955. The wheel point method of survey and measurement of semi-open grasslands and Karoo vegetation in South Africa. *Memoirs of the Botanical Survey of South Africa* 29: 1-49.
- TINLEY, L.L. 1969. Dik-dik, *Madoqua kirkii* in South West Africa: Notes on distribution, ecology and behaviour. *Madoqua* 1: 7-33.
- VAN ZYL, J.H.M. 1965. The vegetation of the S.A. Lombard Nature Reserve and its utilization by certain antelope. *Zoologica Africana* 1: 55-72.
- VILJOEN, P.C. 1982. *Die gedragsekologie van die oorbietjie Ourebia ourebi (Zimmermann, 1783) in Transvaal*. M.Sc. thesis, Universiteit van Pretoria, Pretoria.
- VON RICHTER, W., C.D. LYNCH and T. WESSELS. 1972. Status and distribution of the larger mammal species on farmland in the Orange Free State. *Nature Conservation Research Report No 1, O.F.S. Provincial Administration*.
- WEATHER BUREAU. 1987. *Report on Meteorological Data of the Year 1982*. Government Printer, Pretoria.