Observations on the lynx *Felis caracal* in the Bedford district

J.A. Pringle and V.L. Pringle

Specimens were collected in the Bedford district and adjoining areas. A method of hunting lynxes with a pack of hounds is described. Data collected from 108 specimens over a period of 3½ years are analysed. Various aspects of the biology are dealt with, including mass and length, killing and feeding habits, breeding and litters, and lynx–jackal relationships.
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Die eksemplare waarop hierdie ondersoek gegrond is, is in die Bedford-distrik en omliggende gebiede versamel. Die gebruik van honde om rooikatte te jag word beskryf. Inligting versamel van 108 eksemplare oor 'n tydperk van 3½ jaar word ontleed. Verskeie aspekte van die biologie word bespreek insluitende massa en lengte, roof- en vreetgewoontes, teling en werpsels, en rooikat–jakkals verhoudings.
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J.A. Pringle
Natal Museum, 237 Loop Street, Pietermaritzburg 3201
V.L. Pringle
Huntly Glen, Bedford 5780

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The lynx *Felis caracal* was first described by Schreber in 1776 (Ellerman, Morrison-Scott & Hayman 1953) from Table Mountain, Cape Town, where it still occurs but is rare (J. Millar, pers. comm.). As far as can be ascertained it has maintained its original range in southern Africa, and in certain areas of the Cape Province its numbers have increased. The first reference to this species in the Bedford district was made by Pringle (1835) when he mentioned some of the carnivores there, including lions, leopards, servals, brown and spotted hyaenas, hunting dogs and lynxes (rooikat).

Much of our present knowledge of this species comes from observations on specimens in captivity. For example, Kralik (1967), Krishne Gowda (1967) and Cade (1968) have described the behaviour of litters of kittens; Smithers (1971) recorded the methods of stalking, killing and feeding of a young pet lynx; while Leyhausen (1956) studied the killing technique used for prey the size of sheep. Lindemann (1955) investigated territorial behaviour and boundary marking. A comprehensive account of the behaviour is that of Rosevear (1974).

The lynx is important in controlling populations of small mammals in farming areas but if it kills domestic stock it can also become a problem. Data obtained from a controlled hunting campaign in the Bedford district are presented here to illustrate aspects of the killing and feeding habits, and food supply and population fluctuations of lynxes.

Material and Methods

The study area

This is a farming area containing many thousands of head of small stock plus a good deal of its original wildlife but there is no proclaimed nature reserve. It includes the northern part of the Bedford district as well as small adjoining areas of the districts of Tarkastad, Adelaide and Somerset East. This is a mountainous area intersected by deep and rugged valleys in which the slopes are partly covered with bush and forest. Most of the high ground is open grassveld interspersed with scattered patches of bush. Some of the valleys have seasonal streams and there are a few perennial streams. The winters are cold (with frost almost every night) and the mountain peaks are often snow-

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capped; the summers are hot with long, dry periods. The average annual rainfall over the past 66 years is 470 mm (range 254 mm in 1919 to 1000 mm in 1974). Periodic droughts are a normal feature of the climate. The valleys of the Baviaan's River and its tributaries formed the principal area of this investigation which was centred on the farm Huntly Glen.

History

After 1820, when the first settlers arrived, the carnivores were systematically destroyed because of predation on domestic stock until only small species including jackals and lynxes remained. Initially the latter never killed full-grown sheep, but sometimes took lambs. Later certain jackals began killing sheep, and once the habit was acquired, they became very destructive. To combat this menace jackal-proof fences were erected, until by 1920 the whole district was fenced, and the jackals eliminated. Apart from the odd intruding jackal, most sheep farmers experienced no problems until, about 10 years ago, it became apparent that the number of lynxes was increasing. The fences were no barrier to them, they spread to farms where they had not previously been observed, and some began to kill full-grown sheep and goats. Poison proved ineffective, as lynxes ate only freshly killed meat, and spring traps caught a wide range of harmless species in addition to lynxes.

Hunting methods

It was decided to resort to hunting with hounds which were kept at Huntly Glen and trained to follow only lynx. When a lynx is reported the hounds are taken to the area before dawn (this is essential). Upon locating the scent the hounds give tongue, and from the sound it can be deduced when the lynx has taken refuge in a hole or a tree, or escaped. Once aware of the hounds the lynx attempts to evade them by doubling back on its own tracks, climbing over large boulders, or hiding in a tree until the pack has overrun the spot when it proceeds in a different direction. Despite such manoeuvres most of the lynxes chased by the hounds were killed.

Material

A total of 108 lynxes including all age groups was taken in this manner in the study area between 8 May 1972 and 13 November 1975. The following information was recorded: date, locality, sex, mass, length (head-body and tail), number of embryos in pregnant females, and stomach contents. The latter were examined in the field, and the species that had been eaten were identified by the presence of hair, wool or feathers. Observations were made on undisturbed movements on Huntly Glen, on methods of killing and feeding and on flight reaction from the hounds.

Data collected

Of 108 lynxes taken 78 were regarded as sexually mature and the remainder as immature. Mass was used to separate adults from sub-adults. The smallest pregnant female weighed 8,6 kg and this mass was used as the separation point. While mass could be used equally for males and females, it was not an accurate factor for determining sexual maturity, but it was the only available means in the absence of more accurate ageing techniques (Table 1). On average, males were 7,7 cm longer and 3,5 kg heavier than females. The greatest mass for a male (20 kg) represents a new record for this species.

Table 1 Mass and body length of adult lynxes

	Males	Females
Number of adults (>8,6 kg)	46	32
Mean body mass (kg)	14,53	10,98
Standard deviation	2,39	1,44
Range	8,6–20	8,6–14,5
Mean total length (cm)	117,0	109,3
Standard deviation	6,6	5,5
Range	102–127	99–119

Killing and feeding habits

Smithers (1971) has described how the prey is stalked in typical felid manner, the final rush after the stalk being very fast and preceded by a careful settling of the back feet on the ground, as if to gain the maximum grip, the body low, head up, ears pricked and tail horizontal along the ground. Small prey is killed with a sideways slap of the front paws, and birds are caught in mid-air with astonishing speed and dexterity. Leyhausen (1956) studied hunting techniques used by the lynx for larger and long-necked prey. The first bite was made in the shoulder region near the base of the neck while the second bite was delivered over the nape of the neck just behind the head where the canine teeth pierced or severed the spinal cord and sometimes even the hind-brain, causing death instantaneously. In the lynx the canines are long and powerful; the upper canines are separated by a diastema both in front and behind from the adjoining teeth while the lower canines have only a posterior diastema.

The lower incisors are reduced. These gaps and the small incisors allow the canines to penetrate into the prey to nearly their full depth. In the present study observations on a number of sheep, goats and small antelopes killed by lynxes indicated no evidence of the shoulder attack, but only of the bite over the nape of the neck. The punctures in the skin were small and sometimes difficult to find in woolly sheep, and there were no lacerations of the tissues or blood stains. In most cases death was instantaneous but in a few there was evidence of a prolonged struggle - presumably the canine teeth had missed the vital areas. The lynx ate from the edge of the ribs up the breastbone and sometimes took part of the liver, but never touched the stomach or intestines. Whenever a lynx killed a dassie (hyrax) it pulled off and rejected most of the skin and usually consumed the entire carcass except the stomach and intestines. Smithers (1971) observed that a lynx in captivity ate hares, rabbits, guinea pigs and large rats, but invariably discarded the stomachs. However, in the case of birds such as chickens, doves, francolins and guinea fowls, no parts were rejected.

Our observations indicate no evidence that lynxes ever return to a kill or feed on carrion, nor do they bury or store unconsumed kill. They eat only freshly killed prey. On the other hand Miller (1972) states that a lynx will sometimes drag the remains of a kill into the fork of a tree.

Food supply

An examination of the stomach contents of 103 lynxes from

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the study area over 3½ years, expressed as a percentage of the number of specimens examined, is set out in Table 2. (The five specimens omitted were still suckling.)

Table 2 Stomach contents of 103 lynxes

	1972	1973	1974	1975
Number of specimens	9	26	33	35
Percentage of stomachs containing				
Sheep and goats	56	50	46	68
Empty	22	15	33	26
Dassie	11	31	9	6
Undetermined	11	4	12	0

The stomach contents suggest an increase in the number of lynxes which had killed sheep and goats with a concomitant decrease in those which fed on dassies. However, from 1972 to 1974 all lynxes were hunted indiscriminately, but during 1975 selective hunting was practised on those lynxes which persistently killed sheep and goats, while those which fed on wild animals were left undisturbed. For this reason Table 2 shows an increased proportion of lynxes which fed on small stock.

We have also observed that many lynxes subsisted entirely on wild animals, mainly dassies, even although there were sheep and goats on free range. Then for reasons not clearly understood some changed their diet and started killing small stock. This change may have been due to a shortage of available wild prey. For example, following the elimination of jackals, the number of dassies increased steadily. About ten years ago they reached an asymptote in certain areas or were even declining. Apparently at this time the lynxes moved into the vacant niche left by the jackals and began to control the dassies. It was evident from this study that lynxes selected small animals which were easily overpowered, such as dassies, steenbok, vaal rhebok, red hares and rodents as well as sheep and goats, but avoided those which were larger and stronger such as baboons, bushbuck, mountain reedbuck, and springbok.

The findings of others are in agreement. Smithers (1971) recorded the stomach contents of ten specimens from Botswana as Muridae (five species), birds (three species), impala, hares, springhares, lizards and miscellaneous items, and concluded that although the sample was too small to show preferences Muridae occurred most frequently. Bothma (1965) found striped mice, portions of a duiker, grapes and a trace of green grass in a stomach of a specimen from Robertson. Pienaar (1969) recorded that the animals killed by lynxes in Kruger National Park during the periods 1936-46 and 1954-66 included impala lambs, duikers, steenbok, Sharpe's grysbok, wild cats and dassies. Viljoen & Davis (1973) identified a bird, possibly a domestic chicken, and some hair, probably from a warthog, in two lynxes. Twenty-five per cent of the lynxes taken had consumed no food during the previous 24 hours. As hunts took place soon after first light this meant that any lynxes which had not fed that night had to wait at least 12 hours for a meal. This might not materialize as Burton (1962) estimated that carnivores captured less than half the wild animals that they chased.

Breeding

Males and females appear to associate only during the mating period and in all the hunts a male and pregnant female were only once taken together. In four cases a male and pregnant female were taken on the same farm, either on the same day or a week or so apart, but in each instance they were on different parts of the property. Twenty-nine adult males were taken alone, which seems to indicate that each male lived and hunted by itself. In four cases two adult males were taken on the same farm on the same day or within a week of each other, but in each case the localities were far apart.

In the present study eight pregnant females (representing 22% of adults) were taken in April, September, October (3) and November (3). On the other hand, Stevenson-Hamilton (1947) stated that young were usually born during July and August in the eastern Transvaal; while in the Pretoria Zoological Gardens six litters were born in January, February (2), April, May and November. To date numbers of litters recorded are too small to draw meaningful conclusions about seasonality of reproduction.

The number of embryos recorded in the seven females taken by us range from 1 to 4. The number of kittens per litter has been recorded by Sclater (1900) as 2-3; by Shortridge (1934) as 2-4; by Roberts (1951) as 2-4, sometimes 5; by Brand (1963) as 1-3; and by Rosevear (1974) as 1-6.

In our sample of 108 lynxes 30 were regarded to be sexually immature. Of the latter three small kittens were taken alone, apparently abandoned, ten were taken with their mothers and the remaining seventeen were alone. The ten taken with their mothers varied in mass from 0,45 to 7,3 kg; the latter had almost reached the size of the smallest pregnant female which weighed 8,6 kg. The seventeen taken on their own varied in mass from 4 to 8,5 kg. Some of these seemed large enough to be on their own but smaller ones appeared to be too young. In the latter cases it is possible that the mother and her kittens became separated in the course of the hunt and only the kittens were taken.

Other observations

Lynx droppings were often found in the study area but territories could not be defined. It was apparent, however, that males wandered further and occupied a larger area than females. Moreover, every adult male showed battle scars on the head and ears. The European lynx (*Lynx lynx*) buries its faeces and urine within its territory (Lindemann 1955), while on the boundaries it uses obvious middens to demarcate boundaries. No evidence of such behaviour could be found in the present study.

Conclusions

Although no census has ever been undertaken it would appear that since 1965 there has been an increase in the number of lynxes in the Bedford district, judging from the frequency with which they are encountered. This may have resulted from the extermination of black-backed jackals as, wherever the two species overlap, the lynx does not seem to present any problems. It seems likely, in view of its superior weight and formidable teeth and claws, that when the two clash the adult lynx will drive off the jackal. On the other hand, the jackal with its keen sense of smell may well find the lynx nest and devour the young when unprotected.

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Removal of this check will result in an increase in the lynx population.

Lynxes feed mainly on dassies but when these become scarce they adapt by preying on sheep and goats. Only those which persistently kill domestic stock should be destroyed.

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