

# Red fox scavenging at a moose carcass during a winter season

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Red fox *Vulpes vulpes* was the only mammal feeding on a moose *Alces alces* carcass during a total of 26 days between Oct. 75 and Apr. 76. Scavenging on the carcass reached a peak during Nov.—Dec. when analysis of scat samples showed the carcass to be the major source of food. Later in the winter the carcass became hard-frozen and unavailable as food until the spring thaw which occurred during April. Once thawed the carcass was quickly consumed. The changes in carcass consumption appeared to coincide with the seasonal changes in the food requirements of the fox population.

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## INTRODUCTION

The red fox *Vulpes vulpes* is the most important carnivorous mammal in the coniferous region of Eurasia, yet little seems to be known of the ecology and behaviour of scavenging in this common species.

During the winter months ungulate carcasses seem to be an important food source for foxes (Hamilton 1935, Korschgen 1959, Schofield 1960) and the present study provides additional information on scavenging activity by foxes during this period. The results reported here were based on scat analysis and estimates of food consumption collected during periodic visits to a single site baited with a moose carcass.

## MATERIAL AND METHODS

The present study was made at a site located on the shore of a small lake (UTM NN 219283) in Sør-Aurdal, Oppland in South Norway. 837 m.a.s.l. in forested terrain where Norway spruce *Picea abies* is the dominating cover species. Mammalian carnivores known to inhabit this area include *Mustela vison*, *M. erminea*, *M. nivalis*, *Martes martes*, *Meles meles*, *Vulpes vulpes* and probably a few individuals of *Lynx lynx* and *Ursus arctos*. The site was located 11 km from the nearest human settlement, in an area seldom visited by man. During the study period, there was no evidence of human disturbance, other than that of the author.

The study site was baited with the carcass of a bull moose *Alces alces* which had been shot on 8. Oct. 1975 and later abandoned by the hunters

as being considered unfit for human consumption. The hide was pierced in several places by bullets and there were also cuts inflicted by an axe.

Seven visits were made to the site during the period 8. Nov. 1975—25. Apr. 1976 at intervals of between 25—30 days. As any tracks seen in the vicinity of the carcass must have been made after the last snowfall, and as the date of the snowfall prior to each visit was known, it is possible to give some estimate of activity in the area of the carcass. These results are reported in Table 1 and cover 26 days in total. At each visit to the site, the carcass was photographed, sketches made and measurements taken in order to estimate the amount of the carcass which had been consumed.

Signs of fox activity were recorded within an area of radius 20 m from the carcass. Scats were collected in this area and treated collectively for each month. In summarizing the scat analysis (Tab. 2) only recurring items were included. Scat components such as small bone fragments, hairs and fibres are difficult to quantify exactly but attempts were made to classify the items according to their relative abundance.

## RESULTS AND DISCUSSION

### Consumption

During the 26 days covered by examination of tracks, the only mammals to visit the carcass were red foxes. This is strange since 1975 was a low year in the population cycle of microtine rodents and scavenging by carnivores other than

Tab. 1. Estimated consumption of moose carcass together with signs of fox activity in the carcass area. The moose was shot 8 Oct., the first snow fell 16 Nov. and the carcass was free from snow 4 Apr.

Date	Consumption (kg)	Days after snowfall	Radiating tracks	Scats	Resting beds	Sites with twigs chewed off
8.11	0.5 ± 0.5	—	—	2	0	0
7.12	40 ± 10	5	25	2	0	0
2.01	95 ± 15	1	40	9	10	7
31.01	10 ± 5	12	24	10	1	2
2.03	6 ± 2	7	—	10	—	0
27.03	0	1	0	0	0	0
25.04	20 ± 6	—	—	18	—	1

foxes might have been expected. Therefore, if foxes were the only mammals feeding on the carcass, it is probably that consumption by avian scavengers introduces a small error into the evaluation of consumption by foxes, as only a few *Corvus corone*, 2 *Pica pica*, 2 *Cractes infaustus* and 5 *Corvus corax* were seen near the carcass.

The carcass was almost untouched by foxes during the period 9. Oct.—8. Nov. (Tab. 1). The first snow fell on 16. Nov. and when the carcass was visited on 7. Dec. an opening in the belly had been enlarged to form a feeding cavity (65 x 35 x 20 cm, external opening 36 x 20 cm). It was estimated that 40 ± 10 kg of the digestive system and adjacent tissue had been consumed. These findings support the view that scavenging increases in importance as other food sources become unavailable due to snow-cover (Vincent 1958).

During the month of December a further 95 ± 15 kg of the carcass was consumed, mostly in the region of the forequarters and therefore during the period 8.11—2.01, about 135 kg had

been consumed, and this accounted for about 75% of the total weight of the carcass. Therefore it seems that food sources of this magnitude could be important during early winter, when it is known that energy expenditure is increased. Analysis of scat samples showed that scavenging from the carcass was the major food source during this period.

The remaining part of the carcass became hard-frozen and was then probably unavailable during the period Jan.—Mar. This could explain the decline in consumption during this period, but it should also be noted that this period of reduced consumption coincided with the mating period for foxes, when food seeking activity is much reduced.

With the onset of the Spring thaw during April ice in the underlying parts of the carcass melted and the carcass became available as a food source. This was rapidly utilized with consumption being estimated at 20 ± 6 kg during the period 27. March—25. April. An increased food supply in this period when body reserves are low, probably benefits litter size. However, ana-

Tab. 2. Contents of scats from the carcass area. Symbols: Relative occurrence of food items from + least to + + + + most frequent.

Date	8.11	7.12	2.01	31.01	2.03	27.03	25.04
Number of scats	2	2	9	10	10	0	18
Moose							
Hairs		+ + + +	+ + + +	+ + + +	+ + + +		+ +
Bone fragments		+	+	+	+		+ +
Fibres from the digestive system		+		+	+		+ +
Granulated bone							+ +
Small rodents		+	+	+	+		+ +
Birds	+ + +	+			+		+ +
Plant material	+	+	+	+	+		+
Sheep wool							+ +
Fox hairs							+
Garbage							+ +
Indet	+ + +	+	+	+	+		+ +

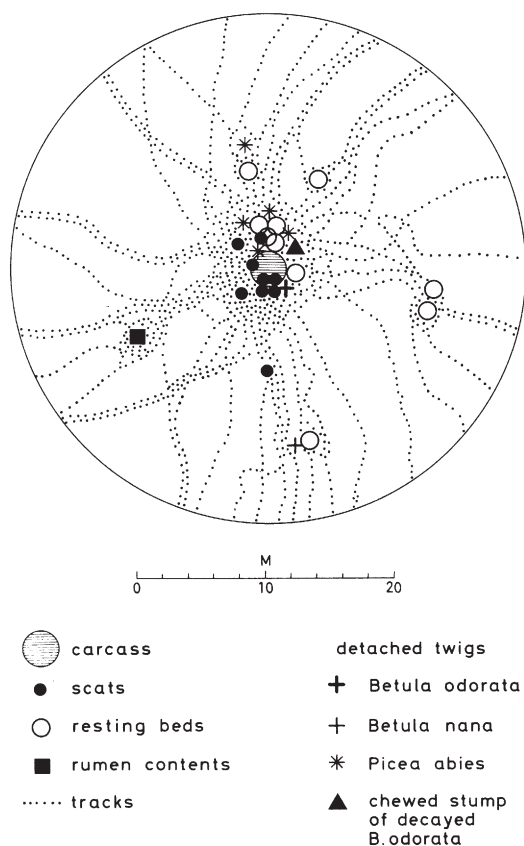


Fig. 1. Distribution of different signs from fox activity in the carcass area during 20 hours between 1 Jan. and 2 Jan. The pattern of tracks is simplified.

lysis of the scat samples showed that many other food items were also taken during this period (Tab. 2) and this probably reflects the consumption of small food items which had remained under snow cover throughout the winter months and became exposed at the onset of the Spring thaw.

#### Behaviour in the carcass area

Tracks and a few scats were the only signs of fox activity in the carcass area during Oct. and Nov., but during Dec. the activity greatly increased (Tab. 1, Fig. 1). At several points within 2–13 m of the carcass, foxes had chewed at the stumps of decayed trees (*Betula odorata*, *Picea abies*, *Pinus silvestris*). But scat analysis did not reveal any wood remains in the faeces. Consumption of fibre from rotting wood has been

indicated in brown bear (Mysterud 1973, 1975) and it has been hypothesized that this aids in the digestion of meat, but other functions have been suggested (Haglund 1968). In canids consumption of fibrous material from grass and sedge has been reported (Murie 1944, Mech 1966) but its function remains uncertain.

In the present study it was also noted that twigs had been stripped from small trees in the vicinity of the carcass. This type of behaviour has not been reported for canids but is known to occur in brown bear and has been interpreted as object marking in the area of the carcass (Mysterud 1975). Saliva deposited at the twigs may additionally act as scent marking (Ewer 1968).

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#### SAMMENDRAG

##### Rødrev som åtselers ved et elgkadaver gjennom en vinter

Rødrev var det eneste pattedyr som opptrådte som åtselers på et elgkadaver i Sør-Aurdal, Oppland mellom oktober 1975 og april 1976. Revenes aktivitet ved åtslet nådde et høydepunkt i november-desember, da analyser av avføringen viste at åtslet var deres viktigste næringskilde. Senere på vinteren frøs åtslet til, og var utilgjengelig for revene inntil tøværet satte inn i april. Da åtslet først var tint, ble det raskt fortært. Det synes som vekslingene i utnyttelse av åtslet falt sammen med vekslingene i revbestandens næringsbehov.

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