POPULATION STUDY ON *MUSTELA ERMINEA* IN NORTHWEST ITALY (VALLE D'AOSTA REGION): CAPTURES, MORPHOMETRIC DATA, DIET

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ABSTRACT – By capturing-marking-recapturing method, 58 stoats *Mustela ernzinea* (37 males and 21 females) were captured from 1990 to 1993 in an alpine area of the Valle d'Aosta region. Trappings were generally conducted from 15th July to 15th October of each year. Considering 2-3 subsequent trapping years the number of recaptures was very low, while in the same year we recaptured on average 57 % of the animals. The population of stoats seemed to show a rapid turnover. The highest level of density was like to be reached at the beginning of September when the dispersal of animals probably started. The diet included exclusively small rodents, mainly *Microtus*.

Key words: *Mustela ernzinea*, Stoat, Trapping, Population dynamics, Diet.

RIASSUNTO – *Studio di popolazione su* Mustela crminea, *nell'Italia nord occidentale (Valle d'Aosta): catture, dati morfometrici, analisi alimentare* – Nel periodo 1990-93, mediante il metodo di cattura-marcatura-ricattura, sono stati catturati 58 ermellini *Mustela ernzinea* (37 maschi e 21 femmine) in una zona alpina della Valle D'Aosta. I trappolaggi sono stati effettuati dal 15 luglio al 15 ottobre di ogni anno. Il numero delle ricatture registrate in anni successivi è molto basso, mentre nell'arco di uno stesso anno raggiungeva mediamente il 57 % del campione di animali catturati. Durante il periodo di studio la popolazione sembrava rinnovarsi pressochè totalmente. Il livello di densità più elevato sembrava essere raggiunto all'inizio di settembre, mese in cui gli animali probabilmente iniziavano a disperdersi. I risultati sull'analisi alimentare indicano una predazione esclusivamente a carico di piccoli roditori, in particolare *Microtus*.

Parole chiave: *Mustela ernzinea*, Ermellino, Trappolaggio, Dinamica di popolazione, Dieta.

INTRODUCTION

Although the stoat (*Mustela erminea*) is a common mustelid in the Italian range, no field study has been done so far. This research was undertaken in the south-west part of Valle d'Aosta (NW Italian Alps), close to the "Colle del Piccolo S. Bernardo", with the main purpose of analyzing the population dynamics and the food habits of this mustelid by using the livetrapping method. Preliminary data on these aspects are presented here.

STUDY AREA

The study area was about 500 ha with an altitude varying from 1800 to 2600 m a.s.l. It could be divided into two zones or sectors on the basis of their physical and environmental characteristics (Tab. 1):

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a) The Touriasse zone was mostly constituted by natural high meadow-grazing lands with large mounds of stones and low twisted shrubs, prevalently *Vaccinium* and *Juniperus*. The human presence was limited to scarce summer tourism and restricted grazing activity (about 150 heads of cattle occurred for 1.5 days in August every year).

b) The Breuil zone was characterized by partially wet meadow-grazing lands and by shrubs of *Alnus viridis*, *Salix* sp. and *Rliododendron ferrugineum*; in the lower part of the trapping area there were larches (*Larix decidua*) forming a thin and scattered wood. Cattle grazing was stronger than that occurring in the Touriasse zone: four alpine summer pastures were used by about 500 heads of cattle over three months (July-September) every year.

Tab. 1 - Physical characteristics and trapping modality of two zones under study (* every night where each trap was opened, computed as 1 trap-night, see material and methods).

	BREUIL	TOURIASSE
Study area size in ha	300	190
Min-max altitude, m a.s.l.	1840 - 2200	2100 - 2550
Snow cover period	Oct. 20-May 30	Sept. 20-Jun. 30
Trapping area size, in ha	156	62
Mean distance between traps, in m	203	164
Trapping period	July 15-Oct. 15	July 25 - Sept. 25
Number of trap-nights *	4984	1726

MATERIAL AND METHODS

The capturing-marking-recapturing method was applied. Wooden live-traps (Edgar's model, King & Edgar, 1977) baited with white mouse were used. The captured animals were ear-marked by incision (Debrot, 1984). Trappings were carried out in 1990 (August 5-19th and September 20-30th) and from 1991 to 1993 continually over three months each year (July 15th - October 15th = trapping season). During the period 1991-1993 the extension of the trapping areas and the trap density were nearly constant. Traps were more spaced in Breuil sector than in the other one (Tab. 1). They were checked twice a day, in the morning and evening, then approximately every 12 hour. The frequency of capture (Fc) was expressed as number of animals captured per 100 Unit Trapping (U.T. = number of open traps x number of trapping nights).

The captured stoats were weighted and the length of hind foot and of head-body was measured. Since we were unable to determine (because of logistic difficulties) the age class of captured animals using defined criteria (e.g. see Delattre, 1987), the morphological data were pooled according to sex only. Considering the animals captured in subsequent years and, for the males, those with fully developed testicles (reliable sign of sexual maturity), we could classify 6 males and 3 females as adults.

The diet was studied analyzing the faeces picked up from the traps. The identification of mammals was done observing transversal sections of hairs, polar resin embedded for light microscopy (Bounous et al., 1990). Slides were compared with a hair atlas (Debrot et al., 1982), to fix a satisfactory determination. Out of 89 collected faeces only 30 were considered to define food habits of stoats. Indeed 59 faeces contained only white hairs of laboratory mouse used as bait in the traps or underhair of small mammals which is unsuitable for determination.

The collected data were expressed as percentage of frequency of the food items. **All** the faeces always contained only one item.

RESULTS

Fifty-eight stoats (37 males and 21 females) were captured. From 1990 to 1993 the frequency of capture decreased (Tab. 2): minimum values were observed in 1993 for males, in 1992 for females.

Analyzing the recaptures we found:

a) a high number of recaptures (on average 57 % of the examined sample) during one trapping season: 12 % of the animals was recaptured once and 45 % more times. **A** maximum of 14 recaptures for an adult female (from July 26th to September 26th) and of 16 recaptures for a young male (from July 31th to August 29th) was recorded.

b) a very low number of recaptured animals (1 male and 3 females), considering two or three subsequent trapping seasons.

From July to October the overall frequency of capture showed a peak at the beginning of September, mainly due to males (Fig. 1).

From biometrical data (Tab. 3) dimorphism indices of 1.7 for weight, 1.24 for hind foot and 1.18 for head-body were recorded.

The diet of stoats was represented exclusively by small rodents, mainly *Microtus* (Tab. 4).

Tab. 2 - Frequency of capture (Fc) recorded per sex and year.

	1990		1991		1992		1993	
	N	Fc	N	Fc	N	Fc	N	Fc
MALES	5	1.1	9	0.66	13	0.62	10	0.35
FEMALES	4	0.88	5	0.37	4	0.19	8	0.28
TOTAL	9	1.98	13	1.03	17	0.81	18	0.63

Tab. 3 - Means of morphological measurements of 58 stoats (SD = Standard Deviation).

	MALES (N = 37)			FEMALES (N = 21)		
	MEAN	MIN-MAX	SD	MEAN	MIN-MAX	SD
Body weight (g)	141.46	88-223	26.38	83.24	68-100	9.47
Hind foot (mm)	38	32-45	2.9	30.7	27-33	1.7
Head-body (mm)	228.5	200-263	14.9	193.3	172-205	7.1

Tab. **4** - Percentage of frequency (%F) of prey eaten by 24 male and 6 females of stoats,

	MALES		FEMALES		TOTAL	
	N	%F	N	%F	N	%F
Clethrionarnys glareolus	8	33	3	50	11	37
Microtus arvalis	13	54	3	50	16	53
Microtus **sp.**	3	13	0	0	3	10

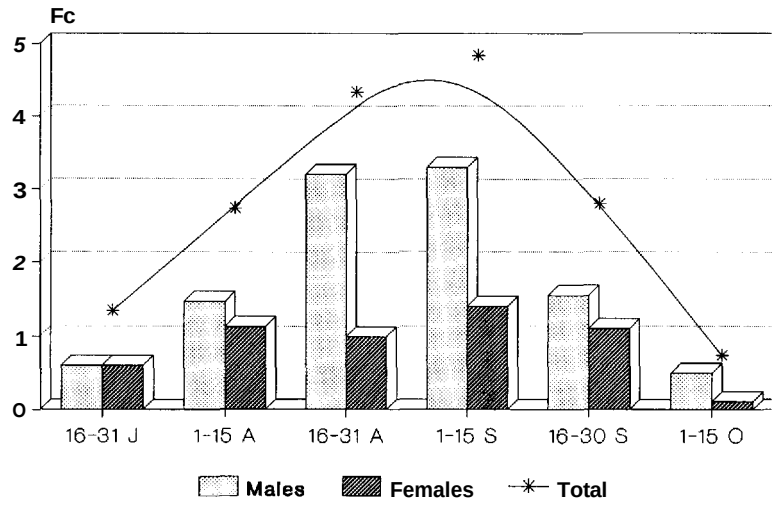

Fig. 1 - Fortnightly frequency of capture **(Fc)** recorded from 16th July *to* 15th October (data of 1991-93 pooled).

DISCUSSION

Even if the two sectors of the study area presented some environmental differences, they were not separated by natural or artificial barriers which could limit movements of stoats. Indeed some males were captured in both trapping zones. Thus the captured animals could be considered members of the same population. Since the frequency of capture recorded in both sectors was similar, we could also suppose that the density of population did not differ one from another.

According to the captures the stoat population included the following individuals:

a) never recaptured stoats **(8** females and 17 males).

b) stoats recaptured very frequently, in traps close one to the other, during the same season, in a short time *(5* females and 16 males). In this group we included juveniles born at the beginning of summer. They sometimes used trap baits as a trophic resource.

c) stoats recaptured during a sole season with a low frequency, in different months, and in traps sometime distant one from another ***(3*** females and 2 males). These animals seemed to maintain a home-range.

d) stoats recaptured in the same sector in subsequent years, and for this reason firmly settled down in their home-range *(5* females and 2 males).

Our data seem to show a rapid turnover of the stoat population. This is like to reach the highest level of density at the beginning of September (a peak in frequency of capture was observed, Fig. 1) when dispersal probably started.

Several causes of mortality can influence the renewal pattern of the stoat. Two marked adult males were killed on the main road crossing the study area. In addition, using radio-tracking method on 14 animals, 4 stoats were preyed. Furthermore we observed attempts of predation on **3** individuals by red foxes

(Vulpes vulpes), kestrels (*Falco tinnunculus*) and flocks of choughs *(Pyrrhocorux graculus* and *P. pyrrhocorax*) which are possible predators of the stoat.

The stoat's diet was based on small rodents that, except *Apodemus* **sp.,** were also casually captured in the traps. Due to the little number of available faecal samples, it was not possible to give a valid indication about differences in diet between sexes (Simms, 1979).

In the trapping area, we captured weasels *(Mustelu nivalis)* till 2100 m a.s.l. Since the spatial distribution of this species overlapped completely that of the stoat, competition for habitat resources could be an important factor influencing the dynamics of population of both mustelids.

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