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LIVE-TRAPPING SUCCESS OF THE MOUNTAIN HARE (*LEPUS TIMIDUS*) IN THE SOUTHERN ITALIAN ALPS

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ABSTRACT - Within a study on the mountain hare (*Lepus timidus*) in Alpine habitat, in March-May 2005 ten live-traps were set in an area included in the Stelvio National Park, while captures with nets were conducted in May 2005 in a surrounding area (Vezzola valley). Trapping success with live-traps was three hares in 210 trap-nights (1.43 captures/100 trap-nights), while two speciemens were captured with nets. Trapping success of our live trapping trial was compared with other studies on alpine mountain hare. All had very low trapping success. We give some indications for improving trapping success of mountain hares occurring at low density population and discuss costs and benefits of the capture by nets.

Key words: Lagomorphs, *Lepus timidus*, mountain hare, trapping methods, Alps, Italy

RIASSUNTO - ***Successo di cattura della Lepre bianca (*Lepus timidus*) nelle Alpi meridionali.*** Nell'ambito di una ricerca sulla Lepre alpina (*Lepus timidus*) in ambienti montani, nel periodo marzo-maggio 2005 sono state posizionate 10 trappole in un'area ricadente nel Parco Nazionale dello Stelvio, mentre sono state effettuate catture con reti in un'area esterna al parco (Val Vezzola). Con le trappole sono stati catturati 3 animali in 210 notti-trappola (successo di cattura di 1.43 catture/100 notti-trappola), mentre 2 esemplari sono stati catturati con le reti. Il successo di cattura mediante trappolaggio è stato confrontato con quelli ottenuti in altri studi condotti sull'arco alpino. Per tutti gli studi si evidenzia un successo di cattura estremamente ridotto. Gli autori forniscono alcune indicazioni per incrementare il successo di cattura della Lepre alpina in aree a bassa densità e analizzano, in termini di costi/benefici, l'impiego delle reti per la cattura della specie.

Parole chiave: Lagomorfi, *Lepus timidus*, Lepre bianca, metodi di trappolaggio, Alpi, Italia

INTRODUCTION

Little is known on the ecology and behaviour of the mountain hare (*Lepus timidus*) in Alpine habitat.

An extensive literature search resulted in one study on intestinal parasites carried out in Italy (Meneguz and Rossi, 1990); two ecological studies carried out in Austria (Slotta-Bachmayr *et al.*, 1997); a degree thesis on spatial behaviour in the Blenio valley (Ticino Canton, Switzerland) in 1995–1997 (Gamboni, 1997) and a technical report

on mountain hare distribution in the Adamello-Brenta Natural Park (eastern Italian Alps; Barbieri, 1998). In contrast, mountain hares have been intensively studied in Scotland (Flux, 1970; Hewson, 1976; Hewson and Hinge, 1990; Hulbert *et al.*, 1996; Newey *et al*,. 2003), Ireland (Wolfe and Hayden, 1996; Dingerkus and Montgomery, 2001) and Scandinavia (Angerbjörn, 1986 and 1989; Hulbert and Andersen, 2001; Hiltunen, 2003; Dahl, 2005a and 2005b). In the holarctic region the mountain hare represents a relict species with a disconnected range, with a typical arctic-alpine distribution (Angerbjörn and Flux, 1995). In Europe the species is present in boreal forests between 50° N and 78° N (Scandinavia, Scotland and Ireland) and in the Alpine region (Italy, Switzerland, Austria, Germany and France; Chapman and Flux, 1990, Angerbjörn and Flux, 1995, Thulin, 2003). In Italy, the mountain hare lives between 1500 and 3500 m a.s.l., causing several logistic difficulties to field-studies.

In this study we estimated the efficiency of two capture methods for hares: the trapping with live-cage traps and with nets. In addition, we compared our trapping success with that recorded in two other alpine studies (Gamboni, 1997; Barbieri, 1998).

STUDY AREA

The study area consists of two different sites, located on the Central Italian Alps, (Valtellina, province of Sondrio, Lombardy region. (Fig. 1). The two sites showed the highest indices of occurrence of the mountain hare in the Lombardy Alps, as inferred by line-transect counts carried out in spring and winter 2004 (Carlini *et al.*, 2004).

Figure 1 - Study area location (black dot). Lombardy region in gray.

The northern study site (“S. Giacomo di Fraele”) extends over 4200 ha and is located near the Cancano lakes in the Stelvio National Park at about 1950 m a.s.l. The area is dominated by trees and shrubs of mountain pine *Pinus mugo*. The undergrowth is composed of heather *Erica carnea*, juniper *Juniperus communis*, blueberry *Vaccinium myrtillus* and lingonberry *Vaccinium vitis–idea*. The southern study site (“Vezzola”, Valley of Dentro, Sondrio province) is a mixed woodland with spruce *Picea abies*, swiss stone pine *Pinus cembra*, mountain pine and larch *Larix decidua*, covering about 2150 ha, at about 2000 m a.s.l. The undergrowth is formed by heather, juniper, alpine rose *Rhododendron ferrugineum* and blueberry.

METHODS

Hares were captured with live-traps in the northern study site. We used Tomahawk single door cat/rabbit collapsible trap of 23x23x66 cm (Tomahawk live trap model

205). Traps were placed along a line-transect, in snow-free spots close to trees with signs of hares activity (pellets, browse and runways; Burton *et al.*, 2002). In March 2005, ten traps were set blocked open and pre-baited for one week with apples, carrots and savoy. Traps were activated one week every fortnight until the end of May, for an overall trapping effort of 210 trap-nights. Traps were set in the evening and checked around sunrise to minimize the risk of stressing trapped animals and to reduce the risk of trapping red squirrels *Sciurus vulgaris*.

Trapping success was expressed as number of trapped animals/number of trap-nights.

Nets were set along a linear, 600 m long front, in an open area bordering woodland in the upper part of the southern study site. Animals were flushed from resting sites by twenty drivers, spaced out 30 m apart, coming up as a linear front across the area. Ten collaborators were waiting near the net and each entangled hare was taken out immediately and put into a dark wooden box to reduce stress. Total trapping area covered about 30 ha. A single drive was carried out on 17 May 2005.

In both cases, hares were further handled for determining sex and age (juvenile, subadult < 7-8 months old, adult > 8 months old) by the observation of external genitals and by Stroh's notch palpation respectively (Broekhuizen and Maaskamp, 1979).

RESULTS AND DISCUSSION

Most studies on mountain hares have used stopped snares (Flux, 1970; Hewson, 1976; Hewson and Hinge, 1990) or live traps, along line-transects (Iason, 1989; Hewson and Hinge 1990) or on grids (Sullivan and Moses, 1986; Hodges *et al.*, 1999). Different kind of live traps have been employed: live trap 23x23x80 cm (Sullivan and Moses, 1986), Tomahawk traps 25x25x 85 cm (Iason, 1989), non-specified Tomahawk live traps (Hodges *et al.*, 1999), or wire live traps (National Wildlife traps) (Angerbjörn, 1986 and 1989). Some researchers used unbaited traps (Iason, 1989; Hewson and Hinge, 1990), others performed pre-baiting and/or baiting with apples (Angerbjörn, 1986 and 1989), alfalfa cubes and apples (Sullivan and Moses, 1986), or alfalfa and rabbit feed (Hodges *et al.*, 1999). A certain number of Scandinavian researchers used drivers and nets (Angerbjörn and Hjernquist, 1984; Angerbjörn, 1986 and 1989; Dahl, 2005b).

In this study, we trapped three mountain hares, 2 young females and 1 adult male, resulting in a low trapping-success of 1.43/100 trap-nights. In the Vezzola study-area, two animals (adult males) were captured with nets.

In Switzerland, Gamboni (1997) trapped hares in a 40 km^2 study area extended over an altitudinal gradient from 1500 to 2050 m a.s.l. and covered for 59% by alpine prairie, 19% by clearings and alluvial cones and 22% by forest mostly consisting of spruce. Seven traps of three types (wooden Tomahawk falling door trap, 62x58x125 cm, and two types of aluminium traps of own design, of 60x60x125 cm or 60x40x120 cm) were set at 16 trap-sites. Traps were placed in accessible positions that had hare signs (tracks, dung and feeding signs) and where traps could be easily hidden. They were baited with fennel, celery, carrots, apples, salad and seeds for Lagomorphs and checked once a day in the morning. Traps were kept baited and remained

on the study area from November 1995 until October 1996. Each trap was activated on alternate days, for an average of 10-15 days per month. Nine mountain hares were captured (4 young males, 3 adult males and 2 adult females). Including recaptures, trapping success was 14 captures on 699 trap-nights, or 2.0/100 trap-nights.

In the study conducted in the Adamello Brenta Natural Park, a total of 65 traps in 1997 and 40 traps in 1998 were placed along line-transects in three different areas showing signs of hare and along hare runways (Barbieri, 1998). Traps were pre-baited for 10 days before each trapping session and baited during trapping with hay, carrots, salad, apples and rabbit feed. They were checked twice a day, at sunset and dawn. In 1997 trapping sessions occurred in May at 1870 m a.s.l. and in June at 1760 m a.s.l. In 1998 another area was chosen at 1850 m a.s.l. where traps were set from 24 March to 21 April, and checked once a day at sunrise. Although total trapping effort was high (1090 trap-nights), no hares were caught.

Comparing trapping success with live traps among the three alpine studies, there was a significantly lower trapping success in the Adamello-Brenta study than in the other two ones (Fisher-Freeman-Halton test, $P < 0.0001$). Excluding the Adamello-Brenta study, where no hares were trapped, trapping success did not differ between the present study and that carried out in Switzerland (Fisher exact test, $P = 0.78$). Mountain hares seem to be attracted by baited traps only when snow-cover reduces access to natural food resources. In effect trapping in spring-summer, without snow, at the Adamello-Brenta site was completely unsuccessful (Barbieri, 1998), while at least some animals were trapped, both in Switzerland and by us, when snow covered most of the study-sites. In our study-area the 2005 winter was exceptionally poor of snow, and vegetation became soon available. This could explain why no more captures occurred in April and May. Hence, it seems that capture-success with live traps is related to the capture period. It will have to be explored in the future whether strongly increasing the number of traps, and thus also the size of the trapping-grid, will result in a marked improvement of trapping-success.

The use of long nets for capturing mountain hares seems a potentially efficient method. However, many logistic problems must be considered. The method needs a high number of operators to drive the animals into the nets and to take them out; the presence of many people and the noise produced to drive hares could stress other animals in the crossed area, and also hares themselves are stressed by running, falling in the net and extraction. Therefore, we suggest to limit drives and net trapping to the summer period, or to areas with no or little snow cover where the use of live traps is likely to produce poor success.

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