



Original Investigation

Habitat use of coexisting introduced eastern cottontail and native European hare

Sandro Bertolino^{a,*}, Nicola Cordero di Montezemolo^a, Aurelio Perrone^b^a Department of Agriculture, Forest and Food Sciences, Via L. da Vinci 44, 10095 Grugliasco (TO), Italy^b Wildlife Science, Via Cossolo 68/A, 10029 Villastellone (TO), Italy

ARTICLE INFO

Article history:

Received 8 August 2012

Accepted 1 February 2013

Available online 25 March 2013

Keywords:

*Lepus europaeus**Sylvilagus floridanus*

Lagomorpha

Agro-ecosystems

Species introduction

ABSTRACT

The niche of introduced species and that of native ones may overlap, thus causing detrimental effects on the latter through competitive interactions. We used radio telemetry to investigate habitat partitioning during the active period by the introduced American eastern cottontail (*Sylvilagus floridanus*) and the native European hare (*Lepus europaeus*) in sympatric conditions. Home ranges of cottontails varied from 1.1–2.2 ha in autumn to 3.0–3.6 ha in summer. In hares, home ranges were 30.5–33.8 ha in summer and increased to 49.5–85.9 ha in winter. Both species used an overall area composed of about 27% of natural habitats (i.e., meadows, woodlands, shrubby habitats, shores, and uncultivated land) and over 70% of field crops. The coexistence of the two species appeared to be facilitated by habitat partitioning. Habitat use of cottontails was characterized by a preference for natural habitats at the study area level as well as within the home ranges, while hares showed a preference for crop fields at both spatial scales and a seasonal selection of meadows within home ranges. Habitat overlap measured with the Pianka index was 0.57–0.64 in autumn and winter, and increased in summer and spring to 0.73–0.78. Our results provide evidence of different resource selection strategies adopted by these two sympatric lagomorph species. Hare populations are often found in agricultural landscapes at low-densities, while cottontails are currently spreading throughout Northern Italy to such an extent that an eradication programme appears unfeasible. In this situation, conservation measures for hares and other species should also take into consideration the presence or possible arrival of cottontails. Habitat restoration measures that would increase the amount of fallow lands and shrublands may favour cottontails more than hares. In areas where introduced lagomorphs are present, the necessity of natural open landscapes for hares may be better faced by increasing the presence of meadows, that are seasonally used by hares and not by cottontails.

© 2013 Deutsche Gesellschaft für Säugetierkunde. Published by Elsevier GmbH. All rights reserved.

Introduction

Interspecific competition is an important factor in structuring ecological communities. The ‘Theory of limiting similarity’ predicts that interspecific competition should lead to a reduction in the niche overlap of competing species (MacArthur and Levins 1967). As a result of the selective processes that determine a segregation of an ecological niche, similar species may coexist for a long time (Rosenzweig 1981). There are numberless resource axes that could be partitioned by species; still, habitat use and diet are the most important (Schoener 1974). Yet, the introduction of non-native species may interfere with this process. The niche (e.g., how species use habitats and food resources) of the new species and that of the native species (one or even more) might overlap, thus causing detrimental effects that may lead to extinction, especially of the latter, via mechanisms of competitive exclusion. Competitive interactions

between introduced and native species have been investigated by several studies that included also lagomorph species (e.g. Stott 2003; Thulin 2003; Flux 2008).

The eastern cottontail (*Sylvilagus floridanus*) is a lagomorph native to America that was introduced into some European countries for hunting purposes; apparently, though, wild populations survived only in Italy (DAISIE 2011). The first introduction into this country dates back to the 1960s; in later years the species was further introduced into several other places (Bertolino et al. 2011c). The cottontails distribution is largely restricted to north-western regions, where the European hare (*Lepus europaeus*) is the only native lagomorph present in the lowlands. In this area of intensive agriculture, hare populations often occur at low densities, as a result of habitat degradation, agricultural intensification, diseases, and over-hunting (Angelici and Spagnesi 2008). On the contrary, in the past 10 years the cottontail has dramatically expanded its range and population densities increased in many areas (Bertolino et al. 2011c). In such a context, inquiring about the possible negative impact of cottontail on hare populations is of fundamental importance for the conservation of the latter.

* Corresponding author. Tel.: +39 0116708677; fax: +39 0116708586.

E-mail address: sandro.bertolino@unito.it (S. Bertolino).



Fig. 1. Study area and its location in Piedmont – Italy. Horizontal lines: shores; black: woody habitats (woodlands, shrubs and hedgerows); grey: spontaneous vegetation; diagonal lines: meadows; white: crops fields.

Competition should be mediated by a similar ecological niche and by the possibility for the introduced species to reach higher densities. Effective tests on exploitation competition are provided by removal experiments (Redfield et al. 1977) and by comparing the population performance in either sympatric or allopatric species (Gurnell et al. 2004). However, considering that in order to coexist species should differentiate their ecological niche, a high niche overlap is assumed to be a prerequisite for competition to occur, and the availability of information on resource exploitation is therefore important for understanding interspecies relationships.

Studies on habitat use and partitioning between lagomorphs already provided evidences of possible competitive effects. In Ireland, the native Irish hare (*Lepus timidus hibernicus*) and the introduced European hare have comparable niche breadths that highly overlap, suggesting the potential for competition between the species (Reid and Montgomery 2007). In Australia, larger home ranges kept European hares distant from European rabbits (*Oryctolagus cuniculus*) for most of the night, but the area used by rabbits was not avoided by hares (Stott 2003).

Both hares and cottontails have adapted to cultivated landscapes typical of the Po Plain in Northern Italy. In fact, higher densities of cottontails in the native ranges are associated with the presence of uncultivated land, habitat diversity and development of hedges. Landscape diversity is generally important for cottontails, which need herbaceous habitats connected with hedgerows that provide permanent cover and small patches of cultivation that provide food supply (Chapman et al. 1980; Swihart and Yahner 1982). Similar habitat requirements were observed for cottontails in Italy (Vidus-Rosin et al. 2008, 2010; Bertolino et al. 2011a,b). In farmlands, hare density increases with the abundance of winter crops and herbaceous habitats. Permanent grasslands usually sustain lower hare densities than arable farmlands, but a positive effect is reported for extensively managed meadows (Meriggi and Alieri 1989; Hutchings and Harris 1996; Zellweger-Fischer et al. 2011). Among other crops, wheat is generally favoured by hares, that prefer farms with some uncultivated fields because these provide cover and food all year round (Tapper and Barnes 1986; Hutchings and Harris 1996; Vaughan et al. 2003). In conclusion, also hares may benefit from a greater habitat heterogeneity, especially in intensively managed areas (Smith et al. 2004).

The previously observed patterns of habitat selection of these two species may drive to either coexistence or a decline of one species as a result of competition. We already reported that in our study area the two species located their daytime resting sites in different habitats, avoiding competition in this part of their

ecological niche (Bertolino et al. 2011a). Cottontails selected almost only shrubby habitats and avoided crop fields in all seasons. Hares were more adaptive in their search, using natural areas and crop fields according to the season.

We, thus, examined habitat use and partitioning by sympatric cottontails and hares during nocturnal feeding activity. Habitat use was assessed at two spatial scales: we considered how species select their habitats (1) at a landscape level and (2) within home ranges. Considering the habitat preferences of the two species (e.g. Chapman et al. 1980; Vaughan et al. 2003; Bertolino et al. 2011a,c), we predicted a partial segregation in habitat use, with cottontails preferring natural habitats with dense cover, and hares rather exploiting open habitats and crop fields. We hypothesized that a coexistence of the two species was made possible by their different use of landscape or habitat structures. By exploring the comparative importance of diverse habitat and landscape features to hares and cottontails, our aim was also to determine management measures that could benefit the native species.

Material and methods

Study area

The study area was located on the right bank of the Orba river (Piedmont region, northwestern Italy, 44°49' N, 8°40' E), in a natural reserve, and in the adjacent game reserve where hunting was prohibited. The landscape was composed by a narrow shore, and, when moving away from the river, by a small woodland and a shrubby area that border with fallow lands, and a mosaic of meadows, field crops and a few poplar plantations (Fig. 1). The shore was partially covered with shrubs and low trees, mainly willows (*Salix* spp.), and poplars (*Populus* spp.). The woodland was mainly composed of black locust (*Robinia pseudoacacia*) and common oak (*Quercus robur*), with a rich understory. The shrubby area was a thick stripe of *Rubus* spp. and *Rosa* spp. with few trees. Crop fields were mainly cultivated with wheat and maize, according to a rotation system.

During 2003 the density of the two species evaluated through night counts (mean \pm SD of three repetitions) was recorded to be 19.9 ± 1.5 cottontails 100 ha^{-1} , and 16.4 ± 7.2 hares 100 ha^{-1} (Bertolino et al. 2011c).

Trapping and telemetry

Cottontails were captured every other month throughout the study period. Cage traps (double entry traps, “100 \times 40 \times 40 cm,

Download English Version:

<https://daneshyari.com/en/article/2193806>

Download Persian Version:

<https://daneshyari.com/article/2193806>

[Daneshyari.com](https://daneshyari.com)