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Abstracts of Oral Communications and Poster Presentations


**Habitat use of European hares (*Lepus europaeus* Pallas) in a Hilly area of central-northern Italy**

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Photo: Juvenile European hares/*Lepus europaeus kursiv* (Ingo Arndt)



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Saxony these analyses will give a basis for the conservation of wolves in Germany.

### Habitat use of European hares (*Lepus europaeus* Pallas) in a Hilly area of central-northern Italy

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The aim of the study was to analyze the habitat selection of European hares, captured inside a protected area fitted for wildlife reproduction and localized in the typical hilly landscape of the Central-Northern Italy.

The trial was carried out during the non-hunting season. The protected, non-hunting area, 761 hectares, was located in the Florence province (X = 1667003 Y = 4844543, ref. Rome, 1940) and was characterized by a fine habitat variety (Shannon index = 2.24). In correspondence of the capture operations for the translocation, 20 captured hares were equipped with a necklace radio tag (Biotrak, TW3): 6 hares (4 males and 2 females) were released in the same area of capture and 14 hares (7 males and 7 females) were translocated in a close Free Hunting Territory (FHT). The tagged hares were localized, and/or sighted individually, 2-3 times a week, from mid January to mid June, 2007. Data, appropriately codified, were analyzed by ANOVA, considering place of release and sex as main effects with their interaction.

The choice of the home ranges seems to be the more interesting and meaning result, rather than the fixes of the animals inside their home ranges. In fact fixes within the hare home range were useful only to confirm land use typology not used by the animals, even if they are included in the home range of the hares. Different home ranges were observed between relocated and translocated hares. Uncultivated fields and scrubland were more present in the home range of the resident hares than in the study area (2.8 times more present in the home range than in the study area: 1st position in the rank). The tree and olive orchards with the wood, on the contrary, were more present in the home range of the translocated hares (1.4 and 1.5 times more present in the home range than in the FHT: 1st rank) and the uncultivated fields and scrubland were less represented (20% less in the home range than in the FHT). Crops for game, orchards, pastures and cereals, highly represented in the area were classified to the last rank, either in relocated or translocated hares.

### Sperm storage, sexual conflict and the timing of reproduction in temperate bats

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Among bats several unusual reproductive strategies have evolved that often include some form of reproductive delay. An extreme form occurs in monoestrous, hibernating species from the temperate zones. The mating season starts after females end breeding and abandon nursery colonies in late summer to early autumn. After mating females store spermatozoa in their reproductive tract until after their arousal from hibernation in the next spring, when ovulation and fertilization take place. Males undergo spermatogenesis during favorable conditions in the summer months. When sperm production ceases, spermatozoa are released to the caudae epididymes where they can be stored viably for several months. Thus, the ability of sperm storage is not limited to females. This might free males from precisely coupling their spermatogenic timing to the female cycle. Furthermore, it enables males to inseminate females throughout the winter during periodic arousals and maybe even up into spring.

In order to assess the progress of male reproductive status, we mist netted bats during their active season at a cave over three consecutive years and measured testis sizes and the sperm fillings of caudae epididymes of four sympatrically occurring species. We observed marked interspecific differences in spermatogenic timing that can be explained by a coupling of the male to the female cycle. Furthermore, males of three species entered the hibernal period with very few epididymal fillings, whereas one species entered winter with considerable amounts of epididymal sperm content. This species leaves hibernacula with still remaining sperm reserves. We argue that the ability of both sexes to store sperm and different interests of the sexes over the optimal time for mating creates a scenario of sexual conflict. The outcome of this conflict might be different between species and may explain the observed interspecific differences in the temporal patterns of the mating season.

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# HABITAT USE OF THE EUROPEAN HARE IN A HILLY AREA OF TUSCANY

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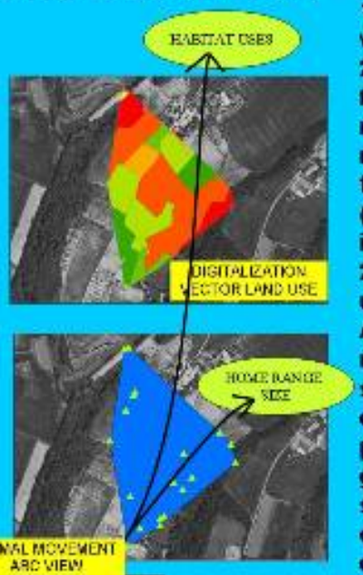
## Introduction

The aim of the study was to analyze the habitat preference of the European hare in a typical hilly landscape located in Center-Northern Italy.




## Materials and methods

The trial was carried out during the no hunting season in a protected area called Bracciatica (Florence province, X = 1667003 Y = 4844543, 761 hectares total, ref. Rome 1940) which was characterized by a fine habitat variety (Shannon index = 2.24). In correspondence of the capture operations for the translocation, 20 captured hares were equipped with a necklace radio tag (Biotrak, TW3): 6 hares (4 males and 2 females) were released in the same area of capture and 14 hares (7 males and 7 females) were translocated in a close Free Hunting Territory (FHT). The tagged hares were localized, and/or sighted individually, 2-3 times a week, from half January to half June, 2007. UTM coordinates were determinated for each localization using a portable GPS than transferred on Arc View software.

Aerial photographs (scale 1:10000) digitalized and geo-referenced were used. 14 different land use categories were selected and digitalized in vector format. These land use were composed by natural uses (woods, shrubs-area, river and ponds), agricultural uses (crops for game, orchards and gardens, grasses and pastures, uncultivated fields, winter and spring cereals, vineyards, tree orchards and poplars, olive orchards) and anthropomorphized uses (extractive and construction sites, road and urban areas).

Animal movement extension was used to calculate Home range sizes (Kernel and MCP). The proportional habitat uses were calculated according to the following formulas:

$$\text{Proportional Habitat presence in the home range} = \frac{\dfrac{\text{Surface of habitat}_i \text{ in MCP of hare}_j}{\text{Surface of MCP of hare}_j}}{\dfrac{\text{Surface of habitat}_i \text{ in the study area}}{\text{Surface of the study area, total}}}$$

$$\text{Proportional Habitat use within the home range} = \frac{\dfrac{\text{Number of fix in habitat}_i \text{ of hare}_j}{\text{Number of fix of hare}_j}}{\dfrac{\text{Surface of habitat}_i \text{ in MCP of hare}_j}{\text{Surface of MCP of hare}_j, \text{ total}}}$$

Data, opportunely codified (ln-values), were analyzed by ANOVA, considering place of release and sex as main effects with their interaction. 0% utilization of an available habitat type was replaced by 0.01%

## Results

Results showed that more interesting and meaningful seems the choices of the home ranges rather than the habitat use within their Home range (fixes of the animals inside their the home ranges).

Uncultivated fields and scrubbed areas were more present in the home range of the resident hares than in the study area (2.8 times more present in the home range than in the study area: 1st rank). The wood and the tree with the olive orchards, on the contrary, were more present in the home range of the translocated hares (1.5 and 1.4 times more present in the home range than in the FHT: 1st rank).

Land use location of the hare fixes in respect to the land use incidence in the Home range, calculated as MCP (analysis on ln values)

| | Sex * thesis | | | | Thesis | | |
|---|---|---|---|---|---|---|---|
| | Released | | Translocated | | | | |
| | Males | Females | Males | Females | Released | Translocated | Overall values |
| Wood | ++ | – | +++ | – | +++ | ++ | +++ |
| | 2nd | 2nd | ns | 2nd | 2nd | ns | 2nd |
| Uncultivated fields and shrubs | – | + | ++ | – | ++ | – | – |
| | 2nd | 2nd | ns | 2nd | 2nd | ns | 2nd |
| Tree and olive orchards | – | – | – | – | – | – | – |
| | 2nd | 2nd | ns | 2nd | 2nd | ns | 2nd |
| Crops for game, orchards, pastures and cereals | +++ | +++ | – | + | +++ | ++ | +++ |
| | 1st | 1st | ns | 1st | 1st | ns | 1st |
| Extr./constr. sites, river, ponds and urban areas | — | — | — | — | — | — | — |
| | 2nd | 2nd | ns | 2nd | 2nd | ns | 2nd |
| Vineyards | + | + | + | + | + | + | + |
| | 2nd | 2nd | ns | 1st | 2nd | ns | 2nd |

note: different ranks differ per p<0.05; ns = no rank differences

Land use partition in the hare home range (MCP) in respect to the overall land use partition.

| | Sex * thesis | | | | Thesis | | |
|---|---|---|---|---|---|---|---|
| | Released | | Translocated | | | | |
| | Males | Females | Males | Females | Released | Translocated | Overall values |
| Wood | ++ | – | ++ | + | ++ | ++ | ++ |
| | 2nd | 2nd | 1st | 1st | 2nd | 1st | 2nd |
| Uncultivated fields and shrubs | + | – | – | – | – | – | – |
| | 1st | 1st | 1st | 2nd | 1st | 2nd | 1st |
| Tree and olive orchards | – | – | + | ++ | – | + | – |
| | 2nd | 2nd | 1st | 1st | 2nd | 1st | 2nd |
| Crops for game, orchards, pastures and cereals | — | — | — | — | — | — | — |
| | 3rd | 2nd | 2nd | 2nd | 3rd | 3rd | 3rd |
| Extr./constr. sites, river, ponds and urban areas | – | – | – | – | – | – | – |
| | 2nd | 2nd | 2nd | 3rd | 2nd | 3rd | 3rd |
| Vineyards | + | + | + | + | + | + | + |
| | 2nd | 2nd | 2nd | 3rd | 2nd | 2nd | 2nd |

note: different ranks differ per p<0.05;

## Conclusions

The different habitat choices of the resident and translocated hares must be taken into consideration when the public game managers trace the borders of the protected areas and the hunting areas.

Finally, even if, crops for game, orchards, pastures and cereals, are considered the best hare habitats, evidently the surfaces present in the study areas (1.3% crops for game, 1.8% pastures, 0.8% orchards and 8.1% cereals) are more than enough to satisfy the nutrient requirements of the hares (resident and translocated) since their incidence is lower in the hare home ranges than their availability in the areas.