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Abstracts of Oral Communications and Poster Presentations

Home range landscape structure of resident and translocated European hares (*Lepus europaeus* Pallas) in a hilly area of Tuscany

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

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populations (Fst) neighbour joining dendograms were constructed. Both dendograms showed similar branch topology, indicating some separation between two groups of populations, first consists of three populations from Vojvodina province (Backa, Banat and Srem) and second consists of remain three populations from Serbia (Eastern, Central and Western Serbia). The most genetically divergent population, based on mtCR-1 sequence variability, was the Western Serbia population and special attention to genetic structure of this European hare population will be paid in further research.

The effects of supplementary feeding in winter on the spatial distribution and activity patterns of female Red deer

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From 2003 to 2007 we collared and tracked six Red deer (*Cervus elaphus*) hinds with GPS-GSM collars in the Nationalpark "Hohe Tauern", Salzburg, Austria. We wanted to get a better insight to the seasonal deer migration from their winter to the summer ranges. A supplementary feeding station was run close to the border of the national park from November to April and former observations suggested an exchange between the feeding station in winter and some specific open, treeless areas in high altitudes in summer. The collars were additionally equipped with activity sensors and so we drew a fine scaled picture of the space use in this alpine area and the activity patterns of deer during day, month and year.

The results showed that there was a strong deer migration from winter (feeding station) to specific summer ranges. The winter home range size was only 5 to 10 hectares and the home ranges were strongly bonded to the feeding station (altitude 1100 m). During the summer months (especially when they are hot and dry) the deer were trekking to habitats in high altitudes up to 2500 metres. The size of the summer home ranges increased to several hundred hectares.

The main activity phases of the deer during the summer months were strongly linked to sunrise and sunset. During the year they generally started to increase their activity phases rapidly at the beginning of May followed by a slow decrease with an activity minimum in January. During the winter months their daily activity was normally at a very low level except the phases of feeding through the local hunters. The results will be discussed in comparison with published data from other regions.

The effect of cooperation on kin recognition in social species of voles (*Microtus arvalis* and *Lasiopodomys brandtii*)

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We compared juvenile behavior in sibling and nonsibling dyads of two species of voles with different social systems, *Lasiopodomys brandtii* and *Microtus arvalis*. Brandt's vole (*Lasiopodomys brandtii*) and Common vole (*Microtus arvalis*) are both social species, but only Brandt's vole is characterized by presence of nonbreeding helpers. We examined a correlation of the ability of kin recognition and benefits of helping in a particular species. As predicted by Hamilton's rule kin discrimination is more likely in species where helping provides larger benefits.

A behavior of sibling and nonsibling dyads of young Common and Brandt's voles was observed at the age of three weeks, 2-3 days after weaning. We observed four activities:

- social interactions – mostly sniffing, distance between animals less than 1 cm;
- individual activities – exploration;
- agonistic behavior-attacks and biting behavior, loud vocalization;
- contact – sitting in contact for at least 5 sec.

We found that *Lasiopodomys brandtii* pay more attention to determine identity of their conspecifics than *Microtus arvalis*. It suggests that species with stable social structure incorporating helpers pay more attention to individual identification than species with highly competitive and unstable social organization without helpers. The ability to discriminate individuals therefore correlates with the degree of cooperative breeding (and benefits of helping) more than with the social system and stability of groups.

Home range landscape structure of resident and translocated European hares (*Lepus europaeus* Pallas) in a hilly area of Tuscany

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The aim of the study was to analyze the differences between the home range landscape structure of resident and translocated European hares during the non-hunting period (January-June).

The trial was carried out in the typical hilly landscape of central Italy (Florence province, X = 1667003 Y = 4844543, ref. Rome, 1940). During the capture operations for the translocation, 20 hares were captured and equipped with a necklace radio tag (Biotrak, TW3): 6 hares (4 males and 2 females) were immediately released in the same non-hunting area where they had been captured and 14 hares (7 males and 7 females) were translocated in a neighbouring hunting territory. The tagged hares were localized, and/or sighted individually, 2-3 times a week, from mid January to mid June, 2007. UTM coordinates were determinated for each localization using a portable GPS and then transferred on Arc View software. Animal movement extension was used to calculate Max, min and average daily movements. Kernel method was used to calculate each home range. Home range sizes also were calculated using the MCP method. Maximum distance from the releasing sites and maximum distance from centroid were also calculated for translocated hares and resident hares, respectively. Aerial photographs (scale 1:10000) geo-referenced and digitalized were used. 14 different land use categories were selected and digitalized in a 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). Landscape metrics for home range (patch density, edge density, fractal dimension, contagion) were calculated using FRAGSTATS software after rasterization process.

Results showed that the Max distance from the releasing sites in the translocated hares was significantly greater than the maximum distance from centroid in the resident hares (simple = radius, or doubled = diameter), (1.281 vs. 368 or 736 m, $p<0.05$). Home range sizes also differed between translocated and resident hares (Kernel 173 vs. 23 ha and MCP 63 vs. 9 ha $p<0.05$). Considering landscape structure indices, the translocated hares preferred landscape characterized by a lower density of patches and edges than the resident's (70 vs. 152 n/100 ha and 258 vs. 448 m/ha, $p<0.01$). Moreover translocated hares preferred areas characterized by greater aggregation and a lower path shape complexity than resident's (contagion index: 61 vs. 54%; fractal dimension index: 1.11 vs 1.12, $p<0.01$). Either the home range sizes or the maximum distance from the releasing sites suggest that the translocated hares must be however released in suited habitats or the animal will move from their releasing point searching better habitats. The increased travels increase the risk to be killed by vehicles when crossing roads.

Home range landscape structure of European hares (*Lepus europaeus* Pallas) in a hilly area of Tuscany

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The aim of the research was to study the structure of the home range of the hares in a typical hilly area of Tuscany where the hunt is not allowed.

In the protected area called Bracciatica (Florence province, X = 1667003 Y = 4844543, ref. Rome, 1940) 6 hares (4 males and 2 females) were captured, and equipped with a necklace radio tag (Biotrak, TW3). The tagged hares were localized, and/or sighted individually, 2-3 times a week, from mid January to mid June, 2007. UTM coordinates were determinated for each localization using a portable GPS and then transferred on Arc View software. Localizations were categorized into two different periods 15 January through 15 February (pre reproduction) and 16 February through 15 June (reproduction). Animal movement extension was used to calculate Max, min and average daily movements. Kernel method was used to calculate each home range. Home range sizes also were calculated using the MCP method. Maximum distance from centroid was also calculated for the hares. Aerial photographs (scale 1:10000) geo-referenced and digitalized 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). Landscape metrics for home range (edge density, contagion, interspersion and juxtaposition, patch richness, Shannon's evenness) were calculated using FRAGSTATS software after rasterization process.

Results showed significant differences only between periods. The hares showed greater number of meters moved per day during the first period than the second period (Maximum speed 350 vs. 48 m/d; mean daily speed 54 vs. 19 m/d; $p<0.05$). Considering landscape structure indices, during the second period, the hares preferred landscapes characterized by a higher density of patches and edges than the first period (227 vs. 154 n/100 ha and 575 vs. 444 m/ha, $p<0.05$). In the first period hares preferred areas characterized by a greater aggregation and a lower interspersion (contagion 53 vs. 48%; interspersion and juxtaposition 75 vs. 88%; $p<0.01$). Moreover the hares showed lower Shannon's evenness index during the first period than the second period (0.78 vs. 0.90, $p<0.01$; $p<0.05$).

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HOME RANGE LANDSCAPE STRUCTURE OF RESIDENT AND TRASLOCATED EUROPEAN HARES (*Lepus europaeus* Pallas)

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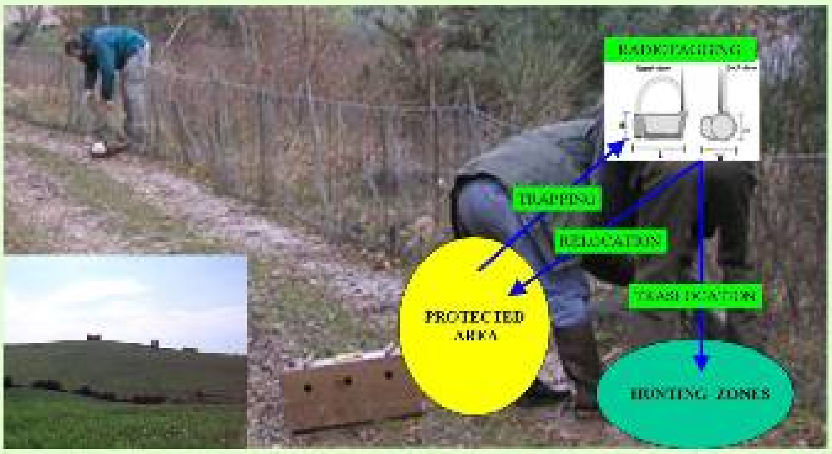
Introduction

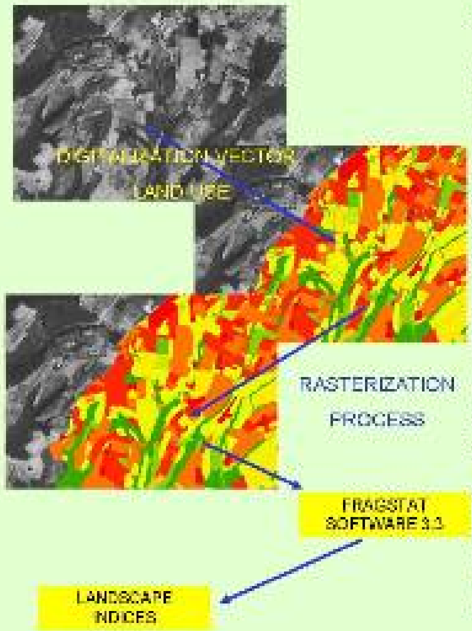
In Italy, during the winter time, the hares are trapping inside the protected areas and relocating in the hunting zones. The aim of the study was to analyze the differences between the home range landscape structure and dispersion of resident and translocated brown hares during January-June (non-hunting period).



Materials and methods

The trial was carried out in the typical hilly landscape of central Italy (Florence province, X = 1667003 Y = 4844543, ref. Rome 1940). During the capture operations for the translocation 20 hares were captured and equipped with a necklace radio tag (Biotrak, TW3): 6 hares (4 males and 2 females) were immediately released in the same non-hunting area where they had been captured and 14 hares (7 males and 7 females) were translocated in a similar neighboring Hunting Territory. The tagged hares were localized, and/or sighted individually, 2-3 times a week, from mid January to mid June 2007. UTM coordinates were determinated for each localization using a portable GPS than transferred on Arc View software. Animal movement extension was used to calculate Max, min and average daily movements. Kernel method was used to calculate each home range. Home range sizes also were calculated using the MCP method. Maximum distance from the releasing sites and maximum distance from centroid were also calculated for translocated hares and resident hares, respectively.

Aerial photographs (scale 1:10000) digitalized and geo-referenced were used, 14 different land use categories were selected and digitalized in a 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). Landscape metrics for home range (patch density, edge density, fractal dimension, contagion) were calculated using FRAGSTATS software after rasterization process.



Results

Results showed that the Max distance from the releasing sites in the translocated hares was significantly greater than the maximum distance from centroid in the resident hares (simple = radius, or doubled = diameter), (1281 *vs.* 368 or 736 m, $p < 0.05$). Home range sizes also differed in relationship to translocated and resident's (Kernel 173 *vs.* 23 ha and MCP 63 *vs.* 9 ha, $p < 0.05$). Considering landscape structure indices, the translocated hares preferred landscape characterized by a lower density of patches and edges than the resident's (70 *vs.* 152 n/100 ha and 258 *vs.* 448 m/ha, $p<0.01$). Moreover translocated hares preferred areas characterized by greater aggregation and a lower path shape complexity than resident's (contagion index: 61% *vs.* 54%; fractal dimension index: 1.11 *vs* 1.12, $p<0.01$).

		thesis			
Effect		re-released		traslocated	
Max distance (m)	Least Sq Mean	368	b	1281	a
	Std Error	324.0		251.2	
Kernel 95 Home Range (sq.m)	Least Sq Mean	230504	b	1726331	a
	Std Error	758575.7		596336.2	
MCP Home-range (sq.m)	Least Sq Mean	95092	b	628456	a
	Std Error	252727.5		196761.9	
Patches density in the H.R. (n/100 ha)	Least Sq Mean	152	A	70	B
	Std Error	12.4		9.6	
Edge density in the H. R. (m/100 ha)	Least Sq Mean	448	A	258	B
	Std Error	21.0		16.2	
Area mean (sq.m)	Least Sq Mean	4703	B	8142	A
	Std Error	601,8		486,1	
Fractal dimension index (n)	Least Sq Mean	1.121	A	1.108	B
	Std Error	0.0037		0.0027	
Contagion Index (%)	Least Sq Mean	54	B	61	A
	Std Error	1.6		1.4	

Note: means with different letters differ per p<0.05 cursive; p<0.01 capital.

Conclusions

The resident (re-released) hares with their movements don't guarantee the occupancy of the non-bordering hunting territories. For this reason the operations of trapping and translocation may be a good methods to increase the hare presence in the non bordering hunting territories.

The landscape structure indices, the home range sizes and the maximum distance from the releasing sites suggest that the translocated hares must be however released in suited habitats or the animal will move from their releasing point searching better habitats. The increased travels, in fact, increase the risk to be killed by the predators or by the vehicles in the crossing roads.